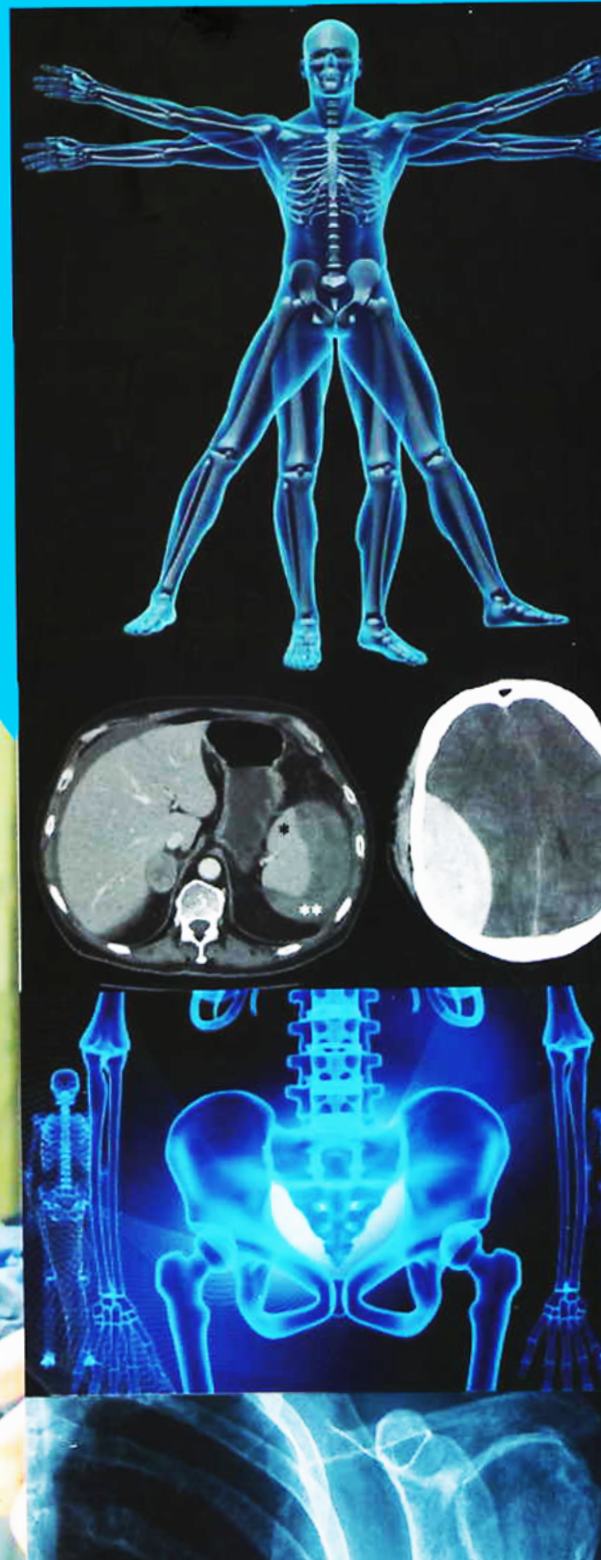


# Surgical Radiology

Dr.Mohammed El-Matary



VISIT...

LANZAROTE  
*Caliente*.COM



## Dedication

Allah the all merciful I beg Him  
to accept this effort  
for the soul of my mother  
She was your gift for me

## Acknowledgement

The author wishes to acknowledge with gratitude all those who had helped in preparation and production of this book & who have contributed with their suggestions and ideas for the new edition:

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## **Dedication**

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**Kareem Kamal**

*Cairo University*

**Mohamed Abbas**

*Cairo University*

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# **Preface**

This book provides an update for medical students who need to keep abreast of recent developments. I hope also it will be useful for those preparing for postgraduate examination.

This book is designed to provide a concise summary of knowledge about surgical radiology, which medical students and others can use as study guide by itself or with readings in current textbooks, monographs, and reviews.

This book is written primarily for those who have some knowledge of anatomy, physiology, biochemistry and pharmacology.

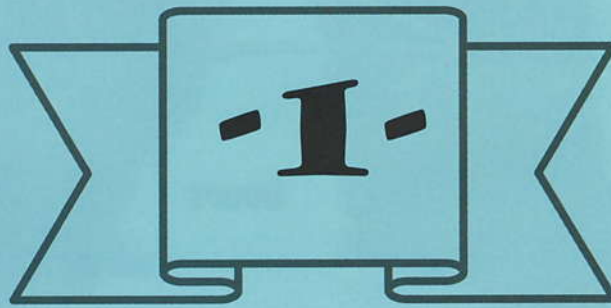
The author is extremely grateful to all the contributors for the high standard of the new chapters, and hopes that you, the reader, will enjoy going through these pages as much as he had.

***M. El-Matary***



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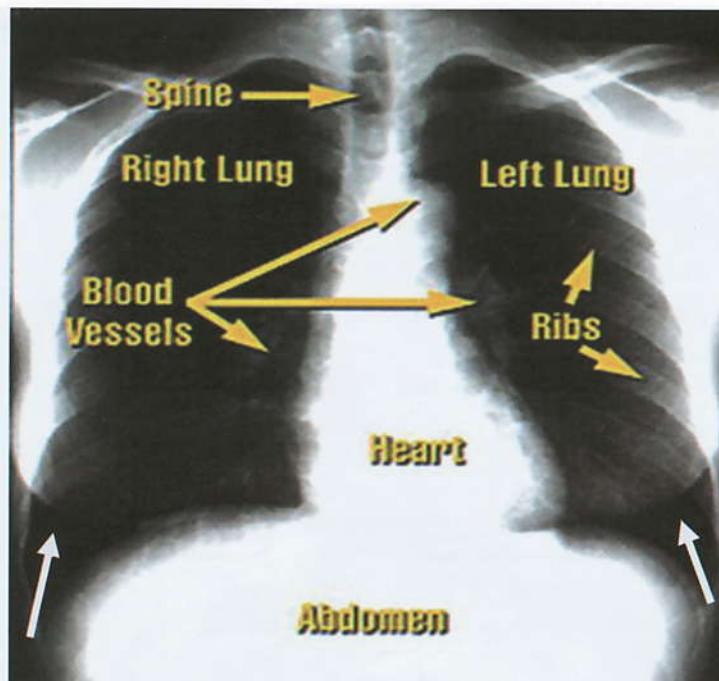
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# **CHEST**

## **Radiology**

# Normal Chest X-ray P-A view



**Female(breast shadow)**

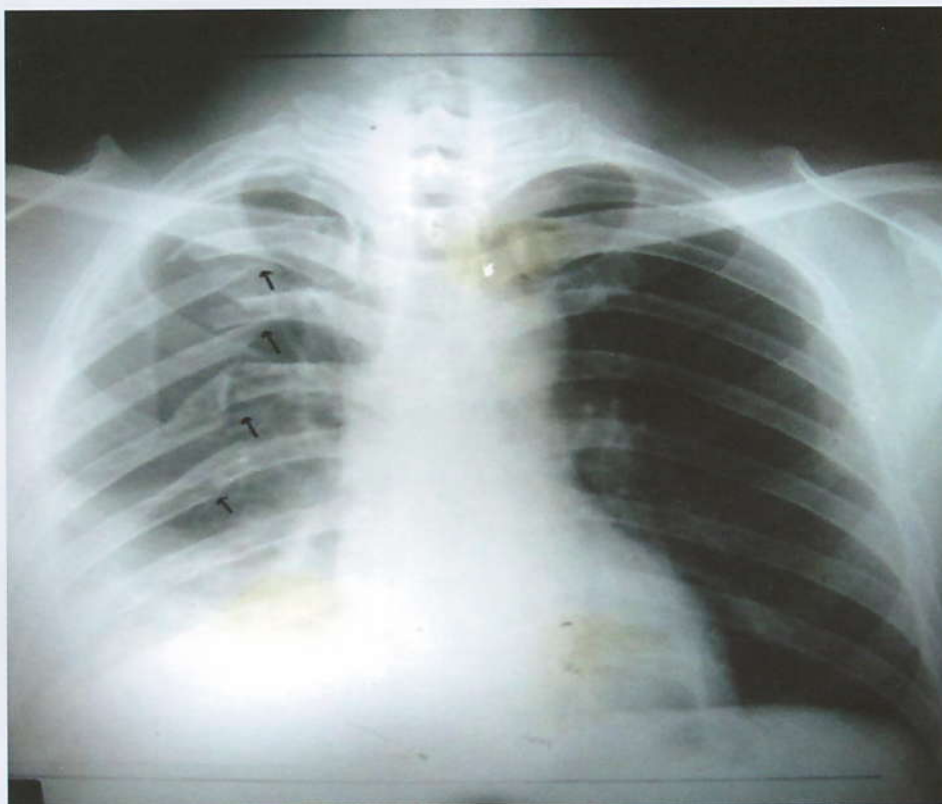


**Male**

- Normal cardio-thoracic ratio.
- Clear lung fields.
- Clear costo-phrenic angles.
- No hilar or mediastinal abnormalities.



# Chest Trauma (fracture ribs)



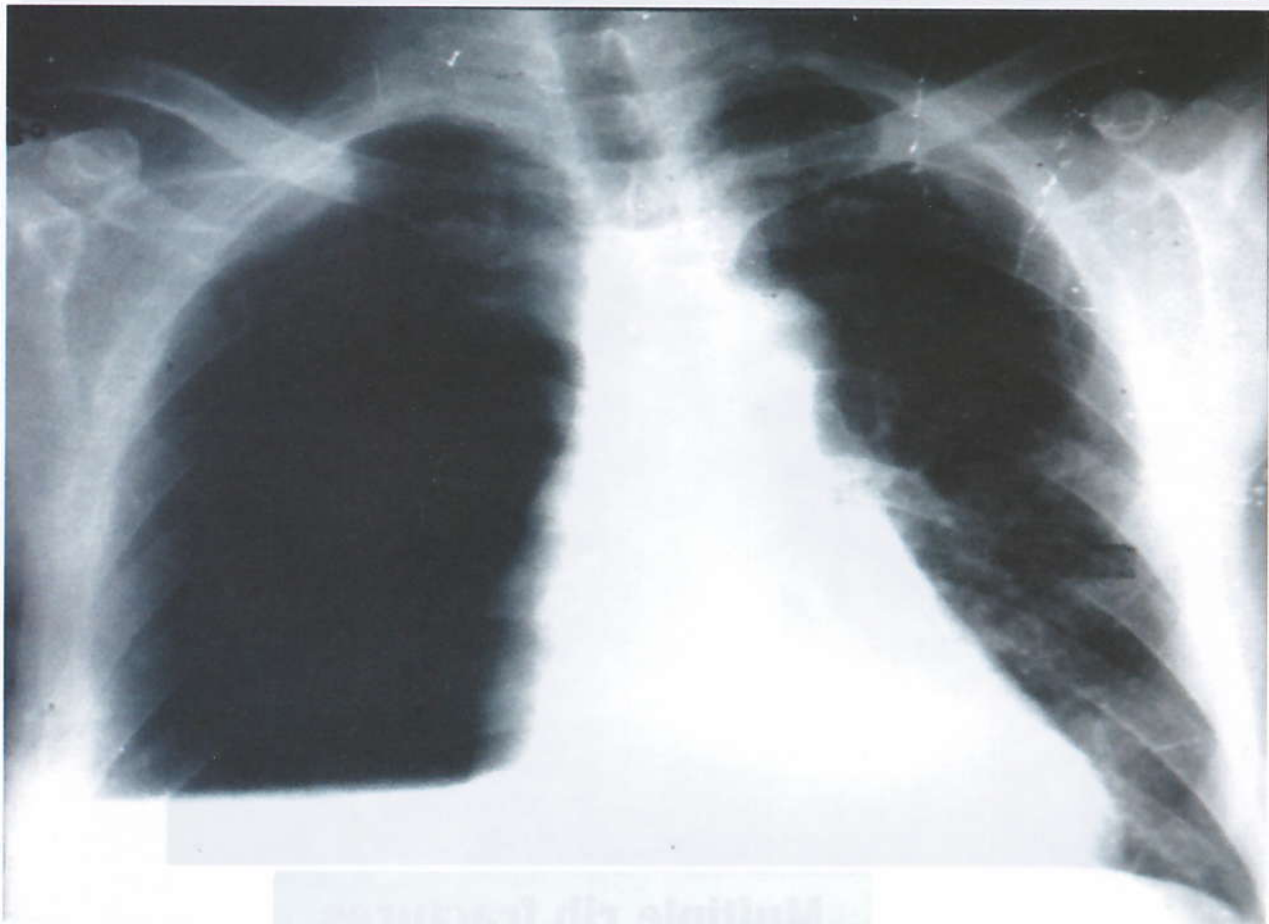
## Multiple rib fractures + Right haemothorax

- Plain Chest P-A view
- Multiple rib fractures on right side (thin arrows)
- Right costo-phrenic angle is obliterated by a shadow that rises in the axilla (thick arrow).
- This is right haemothorax
- If the case is traumatic the diagnosis is haemothorax, otherwise it is pleural effusion

### Questions (True or false)

1. There is bilateral fracture ribs ( )
2. This is the commonest site of rib fracture ( )
3. There is evidence of multiple fracture ribs in this X ray ( )
4. Trauma is the underlying cause ( )
5. The underlying cause is pathological fracture ( )
6. This patient is present by chest pain ( )
7. The Rt lung shows pneumothorax ( )
8. Hemothorax can be treated conservatively ( )

# Hydro-pneumothorax



## Right haemopneumothorax

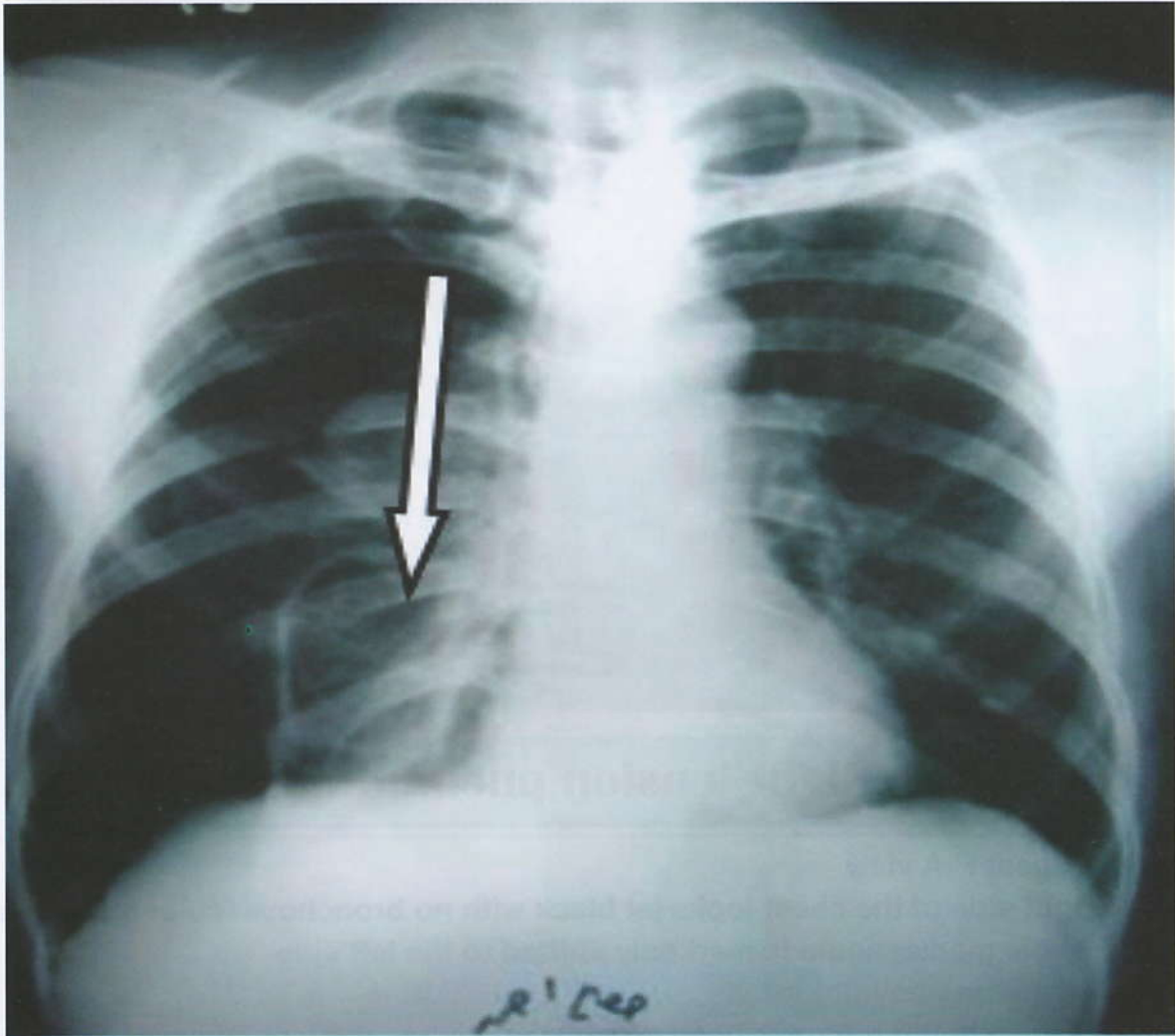
- Plain Chest P-A view
- The arrow points at a transverse air-fluid level.
- This is right haemopneumothorax.
- Notice deviation of the trachea to the opposite side

## Questions (True or false)

- |                                                              |         |
|--------------------------------------------------------------|---------|
| 9-There is RT sided haemopneumothorax                        | (     ) |
| 10-There is mediastinal shift to the right                   | (     ) |
| 11-The main clinical presentation is severe cough            | (     ) |
| 12-The underlying cause could be pathological                | (     ) |
| 13-Trauma is the major underlying etiology of this condition | (     ) |
| 14-The patient may present with congested neck veins         | (     ) |
| 15-This patient may suffer from shock                        | (     ) |
| 16-There is air under diaphragm                              | (     ) |
| 17-Secondary infection is a possible complication            | (     ) |
| 18-CT chest is urgently required                             | (     ) |
| 19-Intercostal tube insertion is the principle treatment     | (     ) |



# Pneumothorax



**Right pneumothorax**

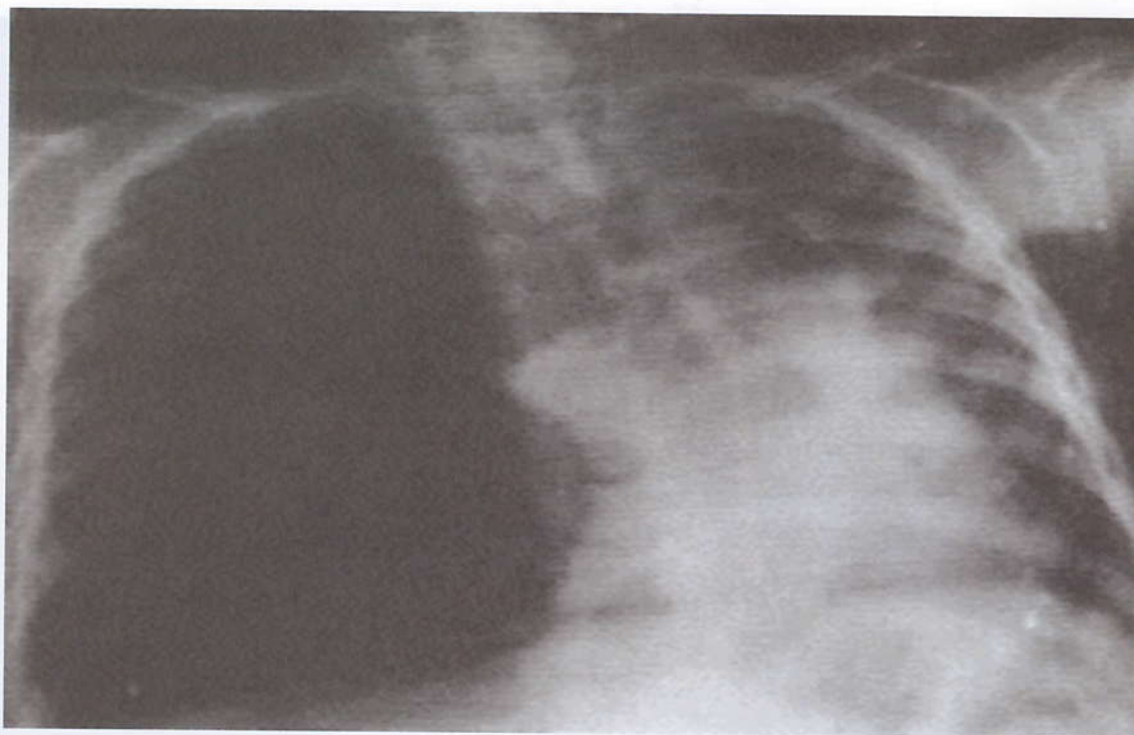
- Plain Chest P-A view
- The arrow points at a collapsed right lung.
- The right pleural cavity is filled with air, which looks jet black because of the absence of bronchovascular markings of the lung (compare with the normal left side).
- This is right pneumothorax

## Questions (True or false)

- 20-This patient may present by chest pain ( )
- 21-There is evidence of lung collapse. ( )
- 22- There is evidence of surgical emphysema. ( )
- 23-Right costo-phrenic angle is obliterated by a shadow that rises in the axilla ( )



# Tension Pneumothorax



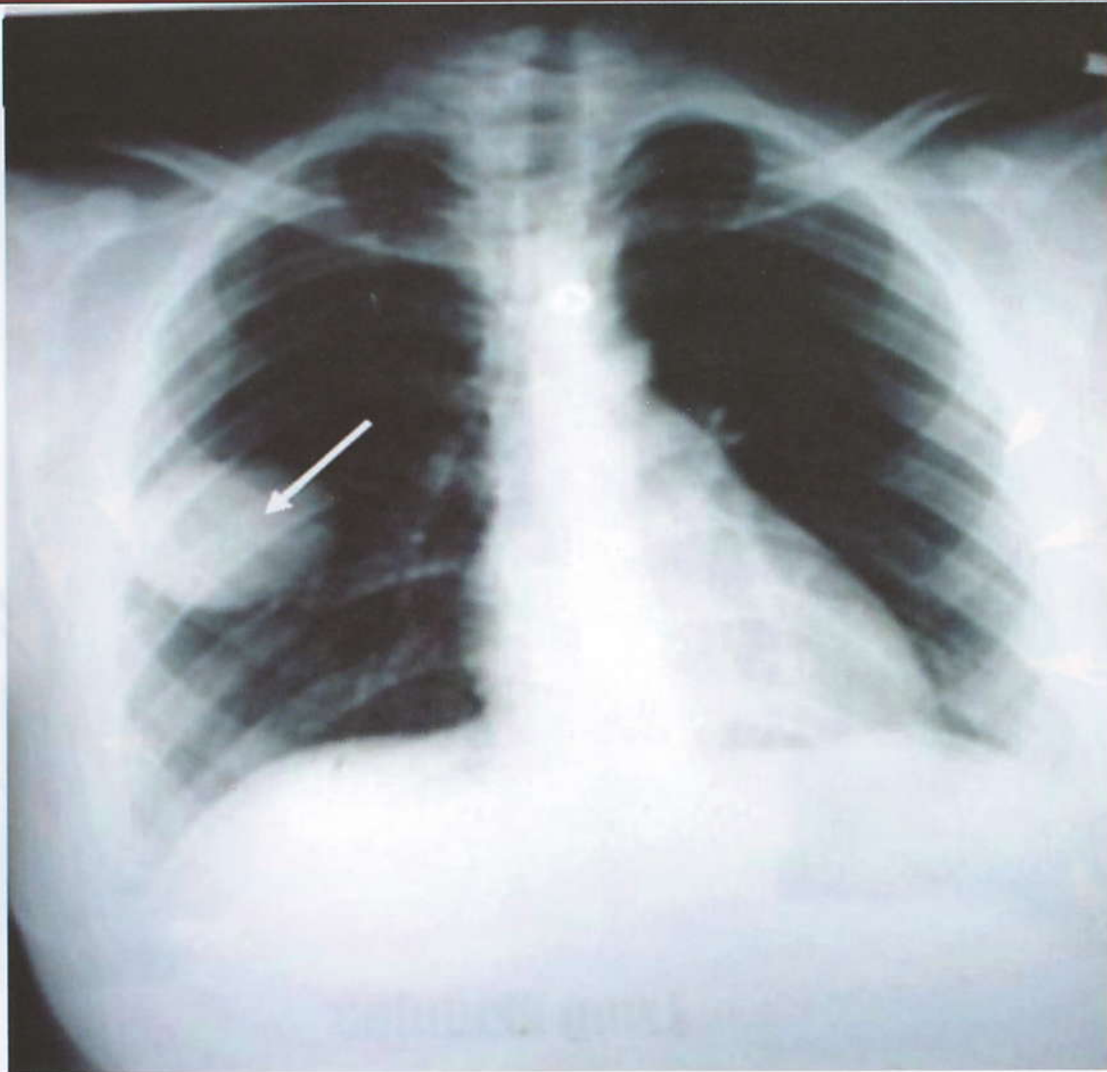
## Right tension pneumothorax

- Plain Chest P-A view
- The right side of the chest looks jet black with no bronchovascular markings
- The whole mediastinum is markedly shifted to the left side
- Right tension pneumothorax
- This X-ray should not have been done because a tension pneumothorax is diagnosed clinically and should be drained immediately with no waste of time

## Questions (True or false)

- 24-There is evidence of lung collapse. ( )
- 25-There is evidence of surgical emphysema. ( )
- 26-This x-ray should have not been done as this case should be diagnosed clinically and treated immediately. ( )
- 27-Clinically, there is dullness in the affected side. ( )
- 28-There is mediastinal shift to the Left ( )
- 29-The main clinical presentation is severe cough ( )
- 30-The underlying cause is a sucking chest wound ( )
- 31-The patient may present with congested neck veins ( )
- 32-This patient may suffer from shock ( )
- 33-The first line of treatment is insertion of wide bore needle in the 2nd intercostal space in the mid-clavicular line. ( )

# Tumours



## Right Solitary coin shadow

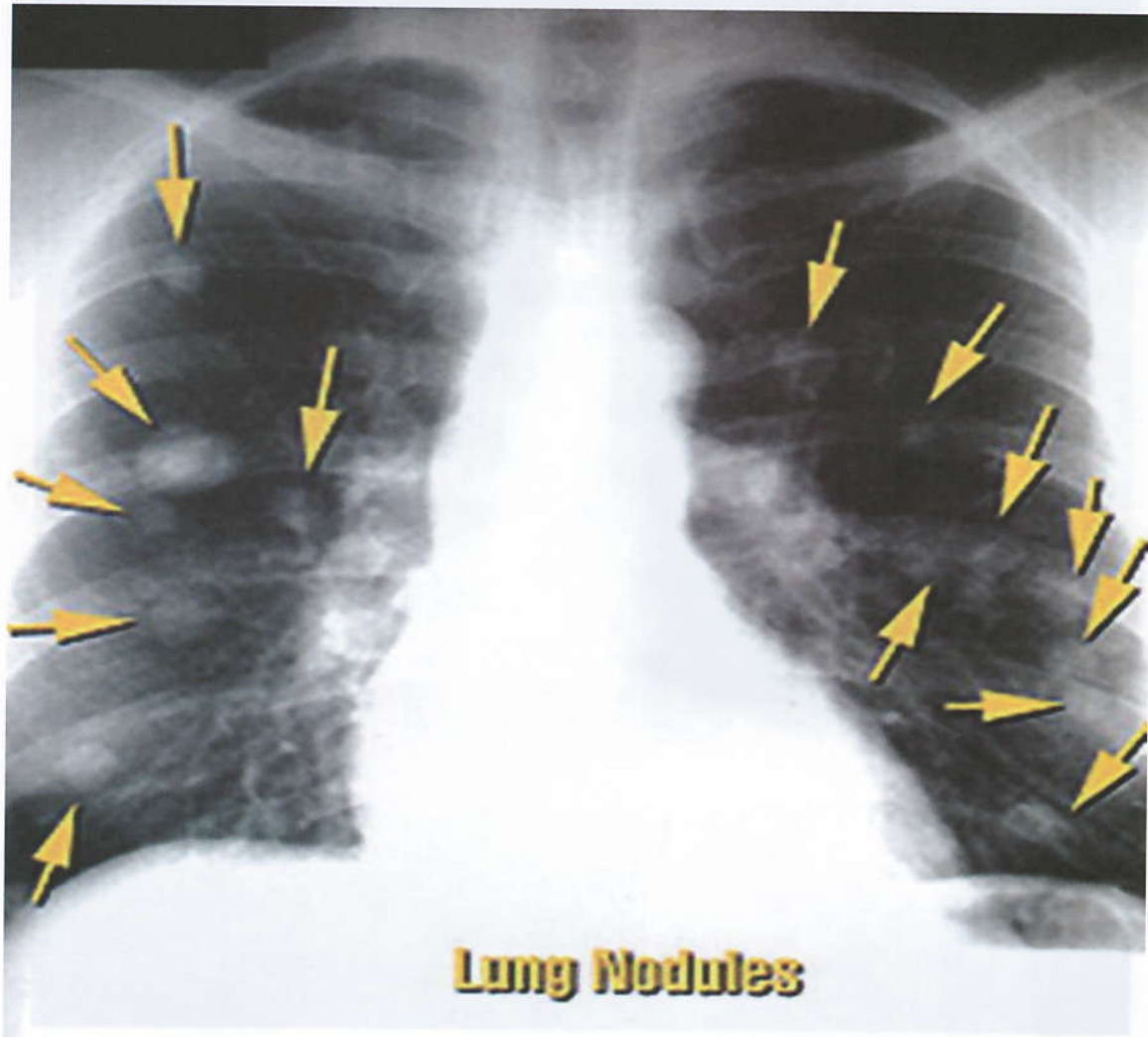
- Plain Chest P-A view
- Solitary coin shadow (arrows)
- Differential diagnosis includes bronchogenic carcinoma, solitary metastasis, adenoma, lung cyst & lung abscess.

## Questions (True or false)

- 34-This lesion may cause Dyspnea, hemoptysis& wheezes. ( )
- 35-Trachea is central. ( )
- 36-This lesion is definitely bronchogenic carcinoma. ( )
- 37-This lesion may bronchial adenoma ( )
- 38-Biopsy is indicated. ( )



# Tumours



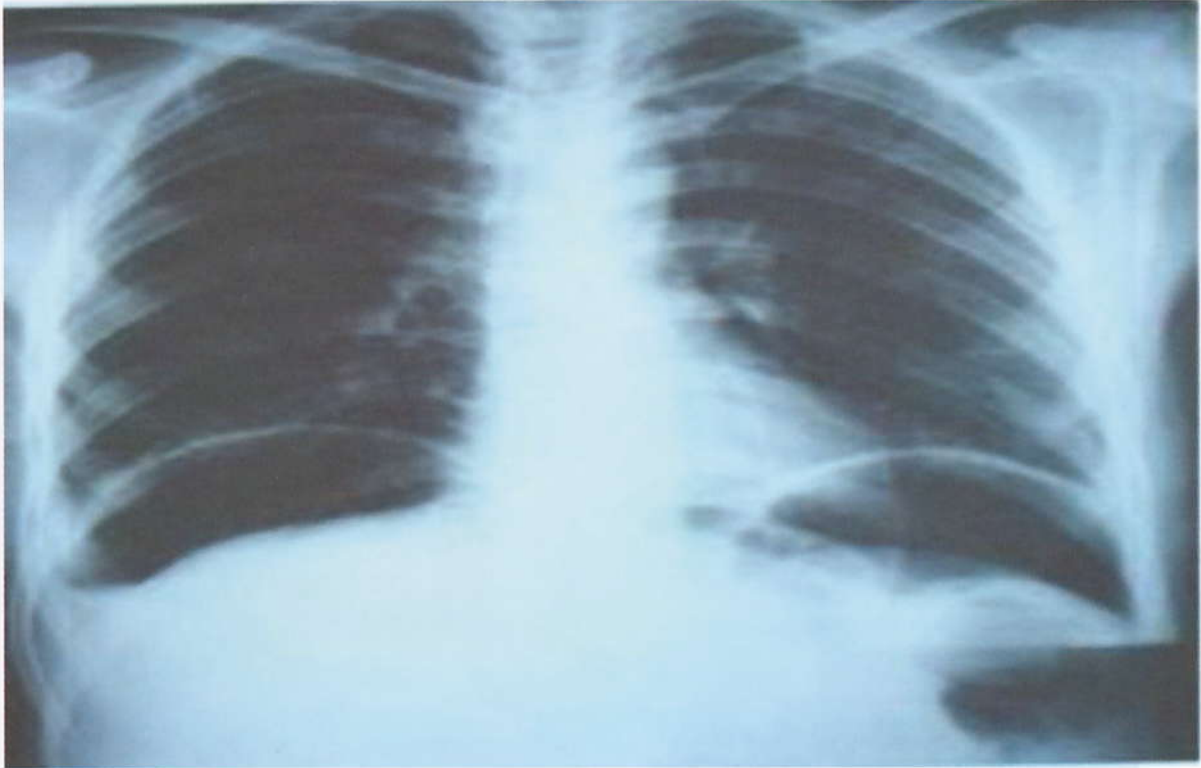
## Multiple pulmonary metastases

- Plain Chest P-A view
- multiple variable sized nodular opacities are seen in both lung fields

### Questions (True or false)

- 39-This X-ray shows bilateral pulmonary filling defects ( )
- 40-Cough and dyspnea are the main clinical presentations ( )
- 41-Fluffy cotton appearance is a characteristic radiological sign ( )
- 42-The underlying cause may be cancer breast. ( )
- 43-Palliative treatment is the treatment of choice. ( )
- 44-Bone scan can be a useful investigation to help diagnosis ( )
- 45-Urgent surgery is indicated in complicated cases ( )
- 46-The prognosis of this condition is poor ( )

# Subphrenic Air



## Air under diaphragm

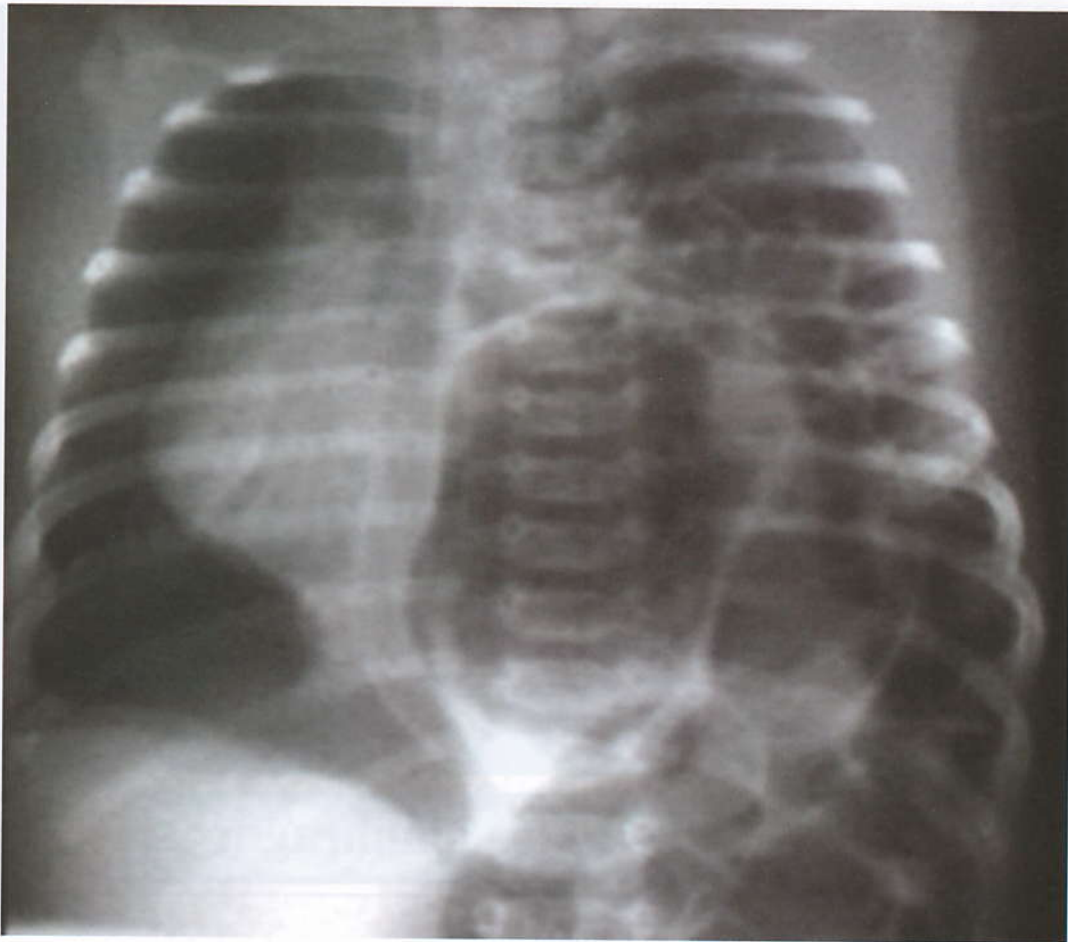
- Plain Chest P-A view
- Most frequent cause of air under the diaphragm is perforated duodenal ulcer.
- Less common causes include perforated other viscera (stomach, small intestine, colon), subphrenic abscess with gas-forming bacteria, and shortly after abdominal operations where air enters through the wound during surgery.

### Questions (True or false)

- 47-This a plain x -ray abdomen erect ( )
- 48-There is air with a fluid level seen under the diaphragm ( )
- 49-The underlying cause is high small intestinal obstruction ( )
- 50-The common cause of death is septicemia ( )
- 51-Perforated peptic ulcer is the commonest cause ( )
- 52-Urgent laparotomy is indicated ( )
- 53-This condition can be seen after laparotomy operations ( )
- 54-Multiple air fluid level is seen in this x-ray ( )
- 55-Acute pancreatitis could be an underlying cause ( )
- 56-This patient is presenting with peritonitis ( )



# Congenital diaphragmatic hernia



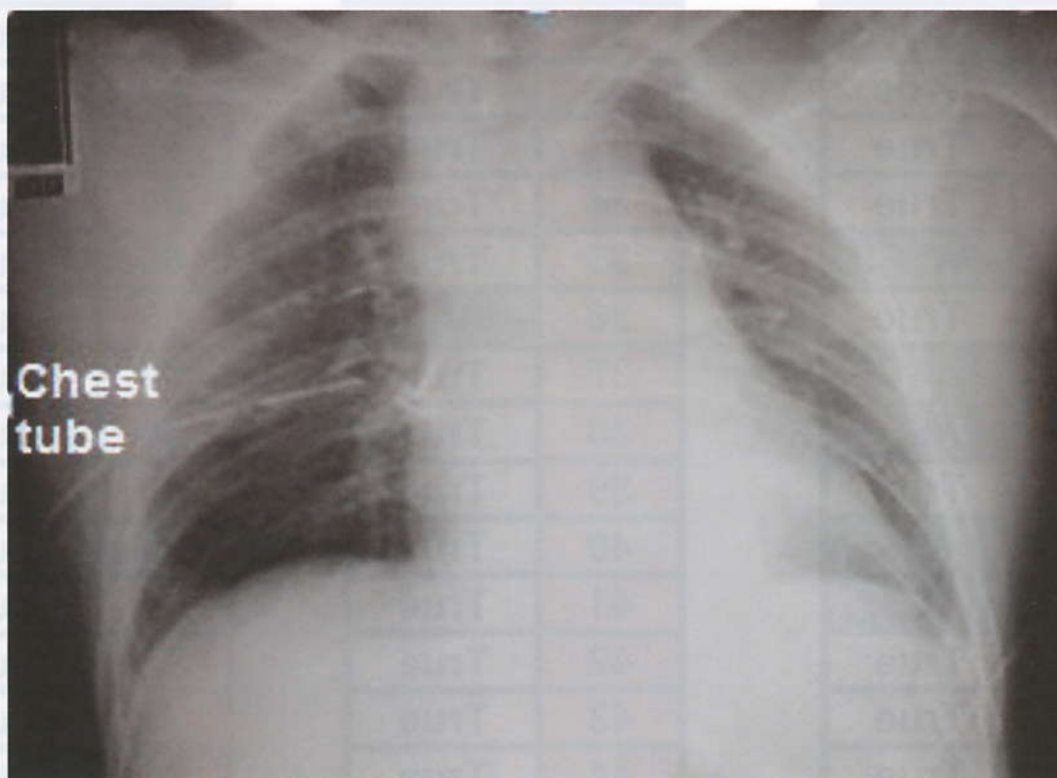
## Congenital diaphragmatic hernia

- Plain Chest P-A view of a child
- The left side of chest is occupied with bowel loops and the mediastinum is pushed to the right side

### Questions (True or false)

- |                                                         |     |
|---------------------------------------------------------|-----|
| 57-This patient is a child                              | ( ) |
| 58-There is a right side pneumothorax                   | ( ) |
| 59-There is air under the right cupola of the diaphragm | ( ) |
| 60-There is air bubbles seen in the right hemithorax    | ( ) |
| 61-This patient presents with dyspnea                   | ( ) |
| 62-This patient presents with scaphoid abdomen          | ( ) |
| 63-There is mediastinal shift to the right              | ( ) |
| 64-The underlying cause is congenital                   | ( ) |
| 65-Congenital heart disease is a common association     | ( ) |
| 66-Surgery is the best line of treatment                | ( ) |

## Wide superior mediastinum



### Wide superior mediastinum

- Plain Chest P-A view
- Common causes of a wide superior mediastinum are retrosternal goiter, lymph node enlargement and thymus tumors
- In a trauma victim it may be caused by rupture of aortic arch

### Questions (True or false)

- 67- Retrosternal goiter can be the underlying cause ( )
- 68- Aneurysm of the thoracic aorta is a differential diagnosis ( )
- 69- This patient may present with dyspnea ( )
- 70- This patient may present with hoarseness of voice ( )
- 71- Diaphragmatic paralysis is a possible complication ( )
- 72- This patient may present with dysphagia ( )
- 73- Surgery is the best line of treatment ( )
- 74- C.T chest can confirm the diagnosis ( )
- 75- Ultrasound guided biopsy is indicated ( )
- 76- Patient may present with cyanosis and congested neck veins ( )
- 77- Thoracic outlet syndrome is the main presentation ( )



## Chest X rays Key answer

|    |       |
|----|-------|
| 1  | FALSE |
| 2  | True  |
| 3  | True  |
| 4  | True  |
| 5  | FALSE |
| 6  | True  |
| 7  | FALSE |
| 8  | FALSE |
| 9  | True  |
| 10 | FALSE |
| 11 | FALSE |
| 12 | True  |
| 13 | True  |
| 14 | True  |
| 15 | True  |
| 16 | FALSE |
| 17 | True  |
| 18 | FALSE |
| 19 | True  |
| 20 | True  |
| 21 | True  |
| 22 | FALSE |
| 23 | FALSE |
| 24 | True  |
| 25 | FALSE |
| 26 | True  |
| 27 | FALSE |
| 28 | True  |
| 29 | FALSE |
| 30 | FALSE |

|    |       |
|----|-------|
| 31 | True  |
| 32 | True  |
| 33 | True  |
| 34 | True  |
| 35 | True  |
| 36 | FALSE |
| 37 | True  |
| 38 | True  |
| 39 | True  |
| 40 | True  |
| 41 | True  |
| 42 | True  |
| 43 | True  |
| 44 | True  |
| 45 | FALSE |
| 46 | True  |
| 47 | True  |
| 48 | FALSE |
| 49 | FALSE |
| 50 | True  |
| 51 | True  |
| 52 | True  |
| 53 | True  |
| 54 | FALSE |
| 55 | FALSE |
| 56 | True  |
| 57 | True  |
| 58 | FALSE |
| 59 | FALSE |
| 60 | FALSE |

|    |       |
|----|-------|
| 61 | True  |
| 62 | True  |
| 63 | True  |
| 64 | True  |
| 65 | True  |
| 66 | True  |
| 67 | True  |
| 68 | True  |
| 69 | True  |
| 70 | True  |
| 71 | True  |
| 72 | True  |
| 73 | True  |
| 74 | True  |
| 75 | FALSE |
| 76 | True  |
| 77 | True  |



## Important points & tweets based on our questions

**Q6:**

- Indirect trauma → fracture ribs at angle (weakest point )
- Intercostal nerve block may be used for severe pain to avoid side effects of general analgesics as opiates inhibit respiratory center .
- Analgesics usually prescribed for severe pain to prevent neurogenic shock

**Q8:**

- The aim of TTT of haemothorax isto drain blood as early as possible , to allow lung expansion.
- Canula & fluids to correct hypovolemia / analgesics / insert chest tube in the 5th intercostals space in MXL & connected to under water seal.
  - ▶ In case of haemothorax blood usually still fluid doesn't coagulate because continuous movement defibrinate blood
  - ▶ Pus or blood in pleural cavity should be drained however the amount
  - ▶ Haemothorax < 500ml will only obliterate the cost-phrenic angle larger amount → opacity raising to the axilla
  - ▶ Definitive ttt of pyo or haemothorax is underwater seal chest tube
  - ▶ **Indication of thoracotomy :**
    - Massive bleeding > 200 ml /hr
    - Chest tube after insertion drain > 2l
    - Clotted & loculated haemothorax , presence of fb
    - Associated with other injuries

**Q20:**

- In simple pneumothorax , chest pain& mild dyspnoea
- In open pneumothorax, mediastinal flutter occurs, clinically diagnosed by sound of air going through the defect
- In tension pneumothorax, severe dyspnoea, Due to compression of the opposite lung and respiratory arrest may occur.

**Q24:**

- Examination shows ↓ air entry , hyperresonance , shift of trachea & mediastinum and engorged neck veins
- Tension pneumothorax cause obstructive shock as it prevent cardiac filling.

**Q30:**

- A small puncture wound of chest wall affecting pleura causing a valve like lesion allow air entry during inspiration , prevent its exit during expiration.

**Q33:**

- The commonest cause of pneumothorax is rupture emphysematous bullae and injuries .
- Open & tension pneumothorax are surgical emergencies should be ttt immediately
- The 1st aid in tension pneumothorax is wide bore cannula in 2nd intercostal space on affected side but the definitive ttt is underwater seal chest tube



**N.B: Bronchogenic carcinoma:**

- More in M : F = 10 : 1
- Smoking is the commonest PDF
- Hilar type is the commonest ( 75%) → squamous cell carcinoma
- Pancost's tumor is peripheral type associated with Horner's syndrome , invasion of brachial plexus and 1st rib
- Paramalignant syndrome is common in bronchogenic carcinoma as cushing like syndrome ,SIADH, hypercalcemia .....etc
- Malignant neuropathies → Abs against neural tissue especially cerebellum and spinal cord causing myasthenia gravis, dermatomyositis and peripheral neuropathy
- Pulmonary osteodystrophy→ sudden clubbing, edema of small joints hands &ankle and pain in ankle
- Bronchogenic carcinoma should be suspected in all patients over 40 who develop abnormal cough, unresolved pneumonia or recurrent pneumonia, chest pain or haemoptysis .even when the pneumonia respond to ordinary medical ttt, the chest should be X- rayed after 3 weeks.

**N.B: Pulmonary metastases:**

- More common from hypernephroma, melanoma, osteosarcoma, carcinoma of thyroid, breast and prostatic carcinoma
- Usually small, equal in size, multiple ( miliary )

**Q66:**

- Death usually 5 days post-operative due to pulmonary hypoplasia

**Q75:**

- Biopsy avoided to avoid aneurismal rupture.

**N.B: Mediastinal syndrome**

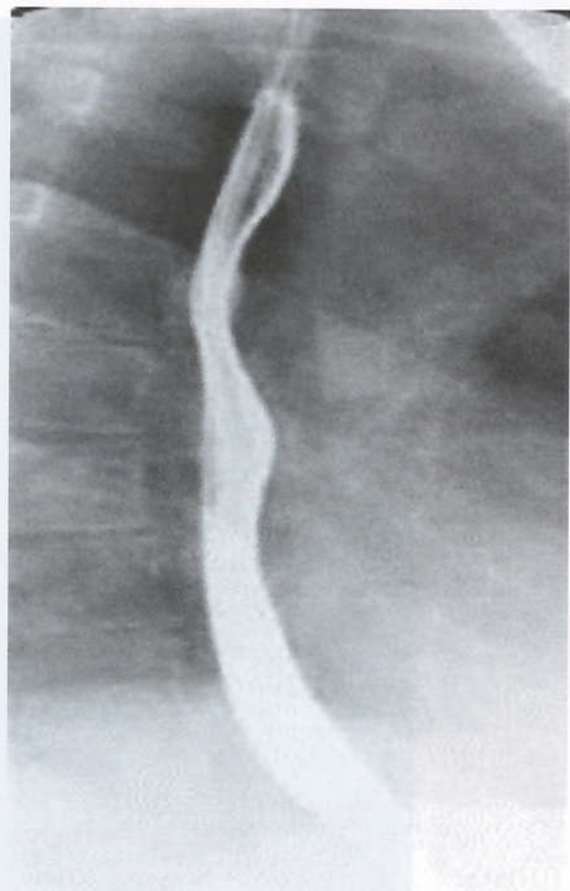
- Superior mediastinal tumor→ retrosternal goiter, thymic tumors, dermoid cyst and teratoma
- Posterior mediastinal tumor →neurofibroma, ganglioneuroma , lipoma and congenital cyst as bronchogenic, gastrogenic and lymphatic cyst
- Thymic tumors present with myasthenia gravis or mediastinal syndrome
- Treatment of thymic tumor is radiotherapy then removal of the tumor through sternum splitting incision

**-2-**

# **Esophagus Radiology**



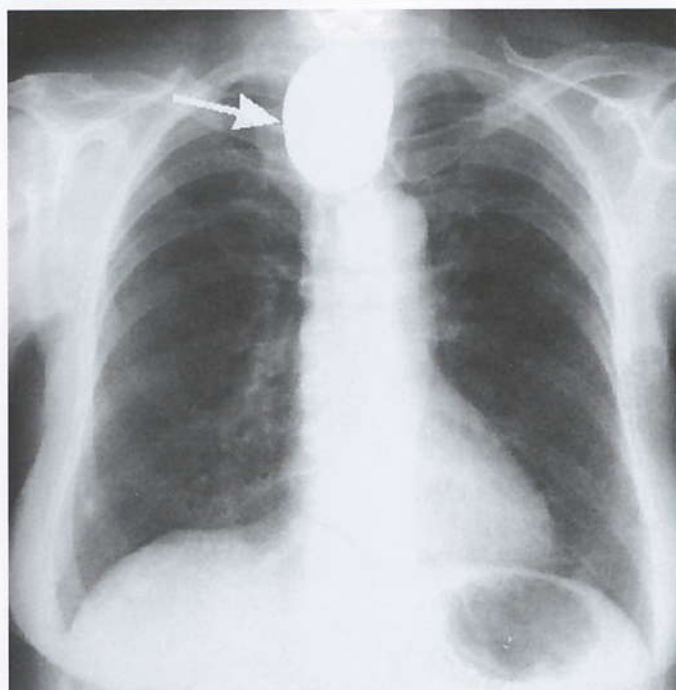
# Normal Esophagus



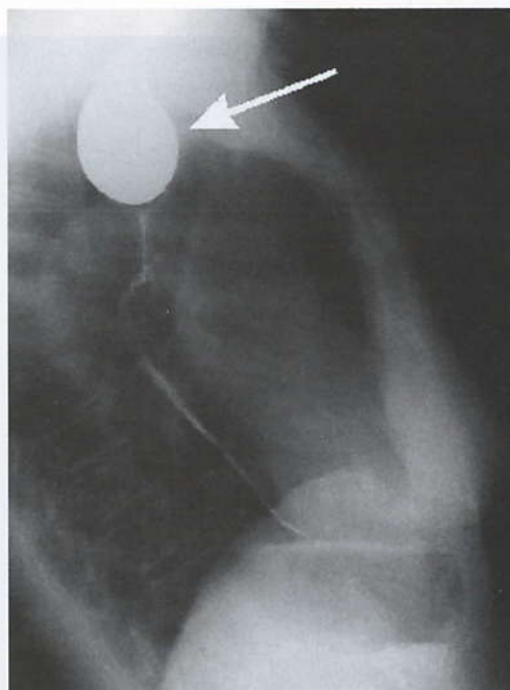
## Normal Barium swallow

- Barium swallow is a contrast radiological test to visualize the oesophagus.
  - Barium, which is a radio-opaque material, is prepared in a paste form.
  - The thickness of this paste allows the contrast material to go down the oesophagus at a slow-enough rate to take radiographic shots.
- **Esophagus has 3 constriction at :**
1. The cricopharyngeus sphincter
  2. Behind the aortic arch and the left main stem bronchus
  3. At the esophageal hiatus

# Pharyngeal Pouch



PA view



Lateral view

- Well defined pouch filled with barium with rounded borders at the root of neck.
- Barium swallow showing an oesophageal diverticulum

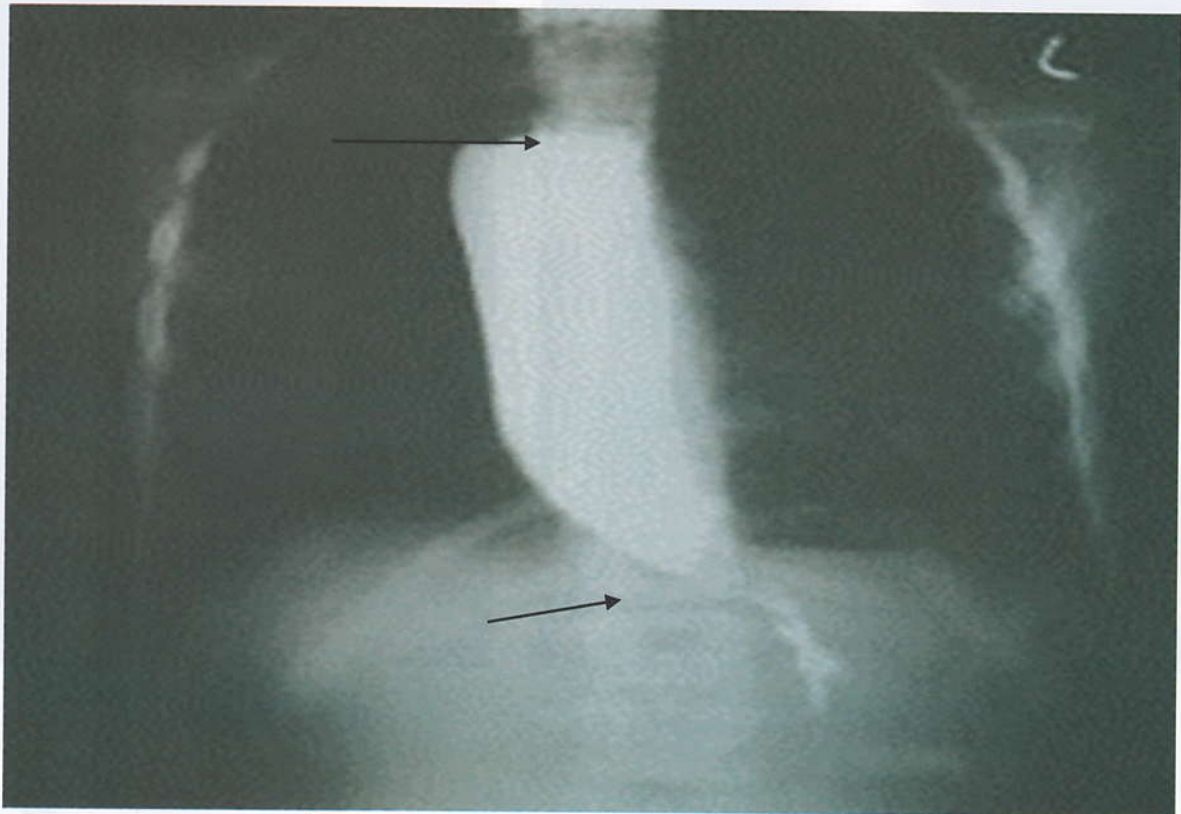


## Questions (True or false)

1. This is Barium Swallow ( )
2. There is an irregular filling defect seen ( )
3. This diverticulum is known as Zencker's diverticulum. ( )
4. The underlying cause is neuro-muscular incoordination. ( )
5. Male to female ratio is 5:1 ( )
6. Patient usually presents by dysphagia. ( )
7. Excision of the diverticulum should be done in advanced cases ( )
8. This patient may present with a swelling in the posterior triangle of the neck ( )
9. This should be differentiated from post cricoid carcinoma ( )
10. This should be differentiated from post corrosive injury ( )
11. Carcinoma may develop within the pouch. ( )
12. Cricomyotomy is the line of treatment in early cases. ( )
13. Principle treatment is cardiomyotomy ( )



# Cardiac Achalasia



**Barium swallow showing  
Achalasia of cardia**

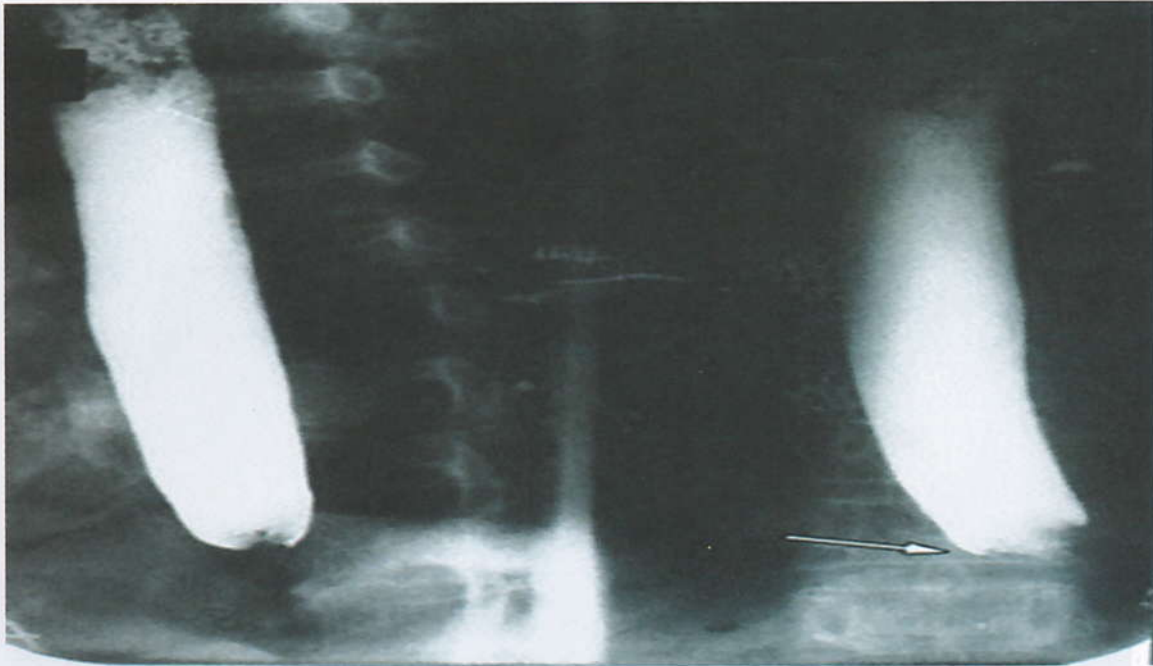
- Smooth narrowing of lower oesophagus at the level of diaphragm(Parrot beak)(Hen's peak)
- Markedly dilated oesophagus, Sigmoid shaped
- Gastric air bubble is commonly absent because retained fluid in the oesophagus acts as a water seal that prevents entry of swallowed gas into the stomach

## Questions (True or false)

14. There is a filling defect seen in this x-ray ( )
15. This patient has dysphagia to fluids more than solids. ( )
16. This patient may present with abdominal distention. ( )
17. Vomiting may be a complaint. ( )
18. Barrett's esophagus is a complication of this disease. ( )
19. PH study is the main investigation ( )
20. Manometric study is a useful investigation for this disease. ( )
21. Shoulder and rat tail is a characteristic finding in this study ( )
22. This condition is treated by cardiomyotomy. ( )



# Cancer Esophagus



**Barium swallow showing  
oesophageal carcinoma**

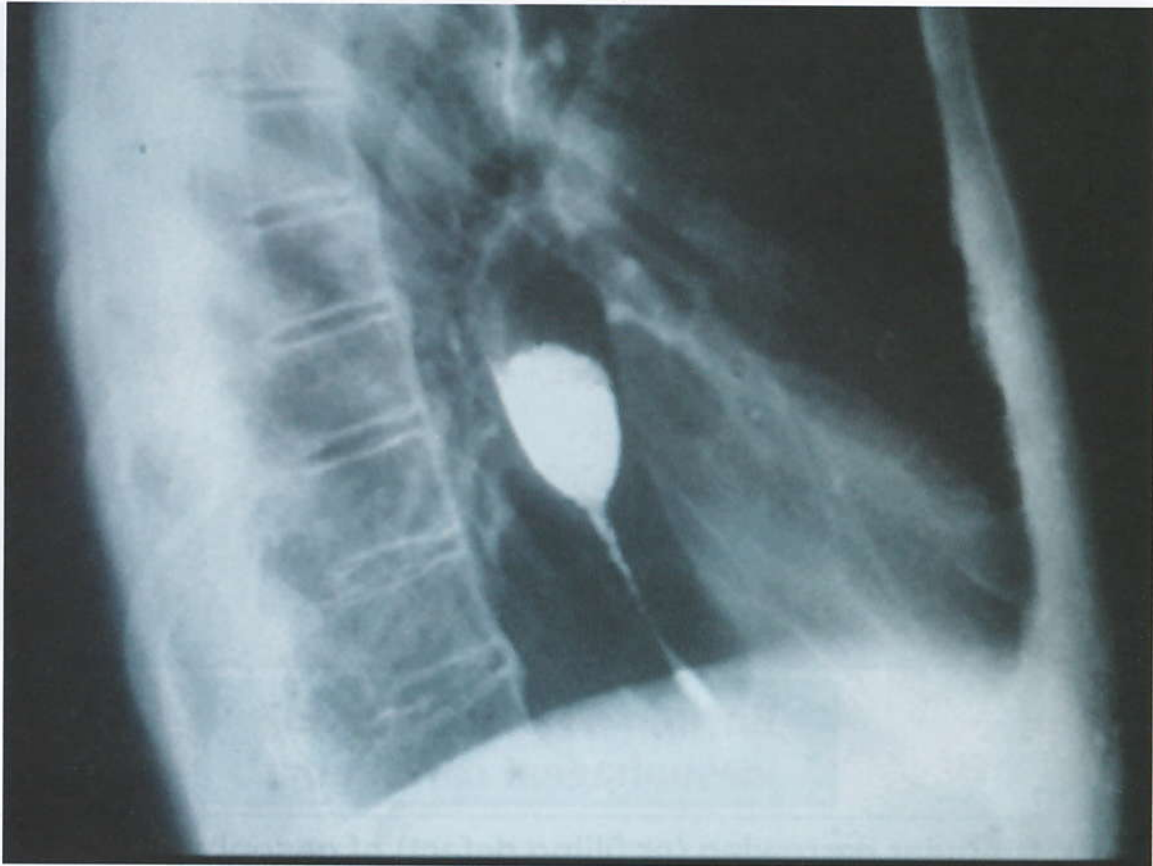
- Irregular narrowing (or filling defect) of oesophagus
- Narrowing is present at any level in the oesophagus
- Mildly dilated proximal oesophagus
- The next step is endoscopic biopsy, followed by staging

## Questions (True or false)

23. This study is a barium meal ( )
24. There is an irregular filling defect seen in this x-ray ( )
25. No esophageal dilatation is seen in this x-ray ( )
26. Dysphagia is an early symptom in this disease. ( )
27. This patient presents with dysphagia to fluid more than solid ( )
28. This patient may present with repeated attacks of vomiting ( )
29. Barrett's esophagus is a predisposing factor ( )
30. Plummer Vinson syndrome may be a predisposing factor ( )
31. Manometric study is needed for this condition ( )
32. Endoscopy and biopsy is the investigation of choice ( )
33. Ultrasound is diagnostic for this condition ( )
34. C.T Chest may be helpful in the diagnosis ( )
35. Esophageal intubation is the best palliative treatment. ( )
36. Operation should be done in complicated cases only ( )
37. This patient may present clinically with a palpable mass in the left supra-clavicular region ( )



# Benign Oesophageal Stricture



**Barium swallows showing oesophageal stricture**

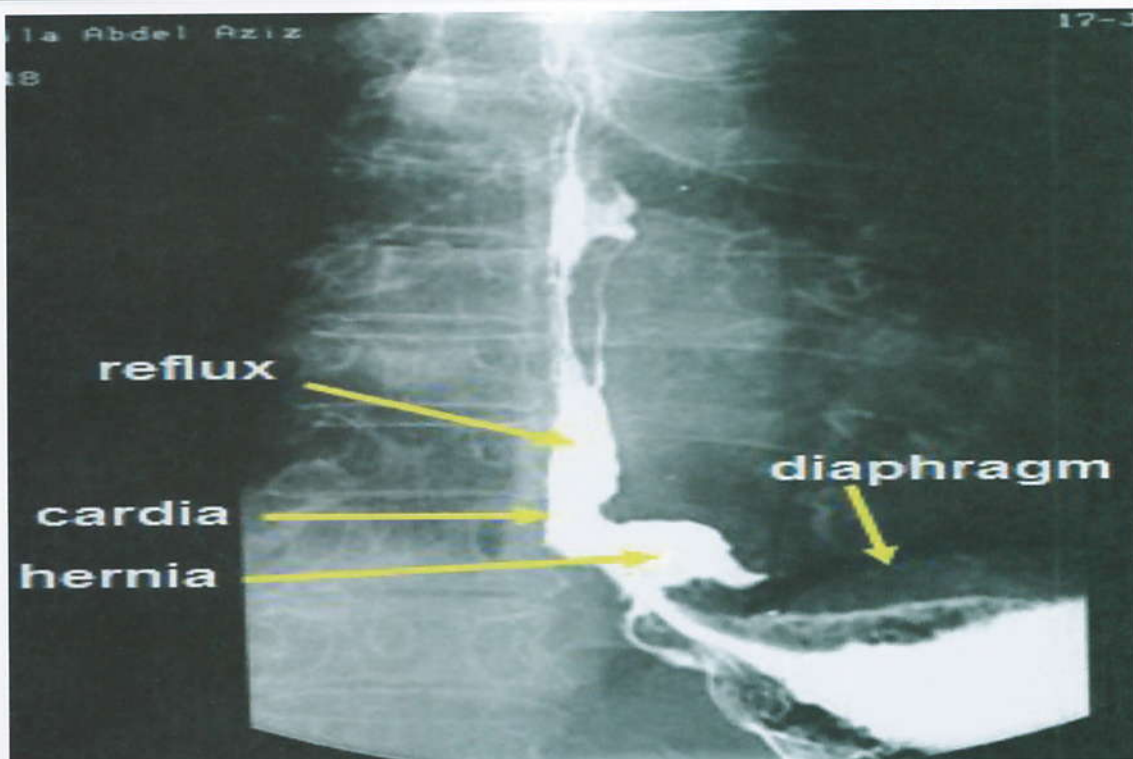
- Narrowing in the middle third with smooth outline & mild proximal dilatation
- This patient gives a history of ingesting a corrosive material.
- The key to diagnosis is the history

## Questions (True or false)

38. The underlying cause is ingestion of a caustic material. ( )
39. The lesion is traumatic ( )
40. The most common age is newborn ( )
41. The main presentation is vomiting ( )
42. It may leads to Barrett's esophagus ( )
43. Cancer esophagus can be DD ( )
44. Chest infection can be a possible complication. ( )
45. Chemical antidote is indicated. ( )
46. The main line of treatment is dilatation. ( )
47. Gastric pull up is the best line of treatment. ( )



# Sliding Hiatus Hernia



## Sliding hiatus hernia with gastro-oesophageal reflux

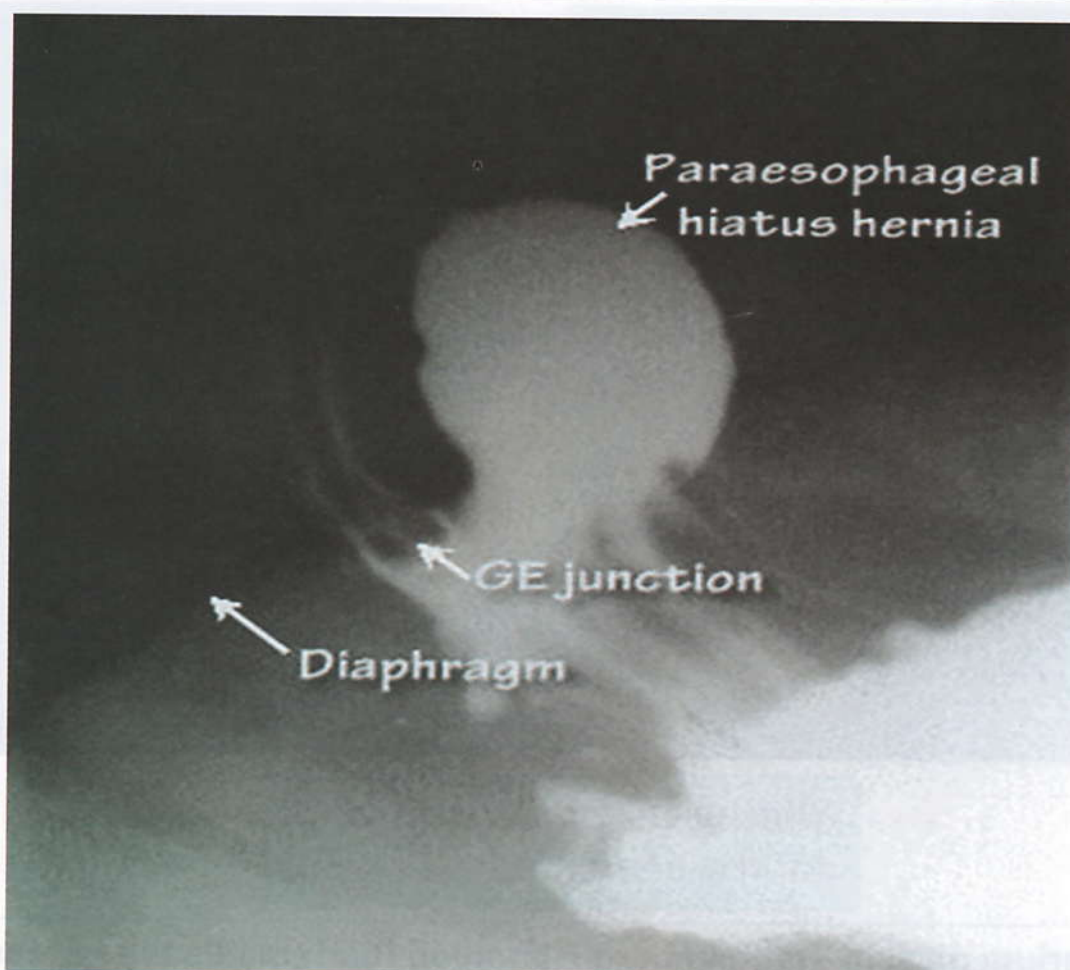
- Barium meal in Trendelenberg's position (barium fills the fundus)
- Gastro-oesophageal junction (cardia) is pulled up in mediastinum taking with it part of the stomach (sliding hiatus hernia)
- Esophago-gastric junction & fundus of stomach situated above the diaphragm.
- Barium refluxed back into the oesophagus

## Questions (True or false)

48. This study is done while the patient is in Trendelenberg position. ( )
49. The Cardia is seen above the diaphragm ( )
50. This patient can present by chest pain ( )
51. Barrette's esophagus is a common complication ( )
52. Long standing cases may lead to esophageal stricture ( )
53. PH study is not of value in this patient. ( )
54. Endoscopy and biopsy can be a helpful investigation ( )
55. Manometric study can be a helpful investigation ( )
56. Fundoplication can be a line of treatment ( )
57. Antacids may be given in the treatment of this condition ( )



## Para-Esophageal Hernia



### Para-oesophageal hiatus hernia

- Barium meal in Trendlenberg's position (barium fills the fundus)
- Part of the fundus of stomach situated in chest beside the normal esophagus.
- The angle between esophagus & stomach is preserved.

### Questions (True or false)

58. This study is done while the patient is in Trendlenberg position. ( )
59. This patient may present by dyspnea following meals. ( )
60. The cardia is seen above the diaphragm. ( )
61. It is herniation of the greater curvature of stomach. ( )
62. Barrette's esophagus is a common complication ( )
63. PH study is of value in this patient. ( )
64. Antacids are a line of treatment. ( )
65. Nissen fundoplication is a line of treatment. ( )

# Esophagous Key answer

|    |       |
|----|-------|
| 1  | True  |
| 2  | FALSE |
| 3  | True  |
| 4  | True  |
| 5  | False |
| 6  | True  |
| 7  | True  |
| 8  | True  |
| 9  | True  |
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| 26 | FALSE |
| 27 | FALSE |
| 28 | FALSE |
| 29 | True  |
| 30 | True  |

|    |       |
|----|-------|
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| 32 | True  |
| 33 | FALSE |
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| 35 | True  |
| 36 | FALSE |
| 37 | True  |
| 38 | True  |
| 39 | True  |
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| 45 | FALSE |
| 46 | True  |
| 47 | FALSE |
| 48 | True  |
| 49 | True  |
| 50 | True  |
| 51 | True  |
| 52 | True  |
| 53 | FALSE |
| 54 | True  |
| 55 | True  |
| 56 | True  |
| 57 | True  |
| 58 | True  |
| 59 | True  |
| 60 | FALSE |

|    |       |
|----|-------|
| 61 | True  |
| 62 | FALSE |
| 63 | FALSE |
| 64 | FALSE |
| 65 | FALSE |



## Important points& tweets based on our questions

**Q4:**

- Protrusion "pulsion" of mucous membrane through Killian's dehiscence due to failed relax. of cricopharyngeus muscle.

**Q5:**

- Usually in elderly male to female is 2:1, usually asymptomatic.

**Q6:**

- Symptoms identical to F.B, then dysphagia.

**Q8:**

- usually in posterior triangle of neck then descends to mediastinum increase after eating and drinking & emptied by pressure.

**Q12:**

- The diverticulum is excised, the neck is closed in 2 layers & cricomyotomy performed

**Q15:**

- Achalasia is more common in the 2nd to 4th decade
- Dysphagia gradual painless more to fluids > solids
- Pulmonary symptoms and regurgitation at night is common

**Q18:**

- Ba swallow is main diagnostic investigation, oesophagoscopy used to exclude carcinoma which may complicate 5% after 20 years, also manometric studies shows failure of relaxation at the cardia

**Q20:**

- ttt may be medical, or hydrostatic or pneumatic dilatation but Cardiomyotomy (Heller's operation) is the standard treatment.

**Q26:**

- After the age of 50, M>F except postcorcoroid carcinoma
- Barrett's esophagitis is the most important PDF
- Most common site is the middle part then lower part then upper part
- It's sq.cell carcinoma in upper part and adenocarcinoma in lower part
- Dysphagia progressive continuous main symptoms to solids > fluids, by the time pt cannot swallow his saliva, tumor involves 2/3 of circumference of the oesophagus.

**Q31:**

- Ba swallow → shouldering
- Esophagoscopy → to demonstrate lesion and take biopsy
- Endoluminal US → detect invasion of mediastinum and LNs enlargement

**Q35:**

- The best palliative method is intubation,
- Radical surgery → total esophagectomy through transhiatal approach then anastomosis in neck,

**Q36:**

- Operation done in patients with good general conditions, resectable lesion, resect the tumor with a safety margin on both sides (10 cm) and restore the continuity.

**Q 41:**

- The commonest swallowing corrosive is potash
- Acid corrosive usually less dangerous than alkali corrosive & produce coagulative necrosis that impedes perforation BUT alkali corrosive produce liquafactive necrosis facilitate perforation

**Q45:**

- The most important 1st aid is to ask patient to swallow some water or milk to dilute the effect of corrosive ,Gastric lavage is contraindicated ,Early intubation is indicated in case of laryngeal edema ,Esophagoscopy done after 24hrs to evaluate case
- Early administration of steroids + antibiotics → markedly diminish tissue scarring

**Q49:**

- Cardic orifice and adjoining part of stomach herniate in posterior mediastinum
- The most accurate test is 24hrs ph monitoring
- Manometric study → loss of high pressure zone

**Q52:**

- Prolonged oesophagitis may lead to Barrett's oesophagus , precancerous

**Q56:**

- TTT usually conservative by weight loss, avoid irritating food and PPIs , Surgical TTT→ Nissan's fundoplication

**Q60:**

- Paraoesophageal hernia it's a true hernia
- Postprandial pain which may be confused with angina occurs rapidly after meal due to distension of intrathoracic part of stomach
- High risk of strangulation so surgical TTT as soon as possible



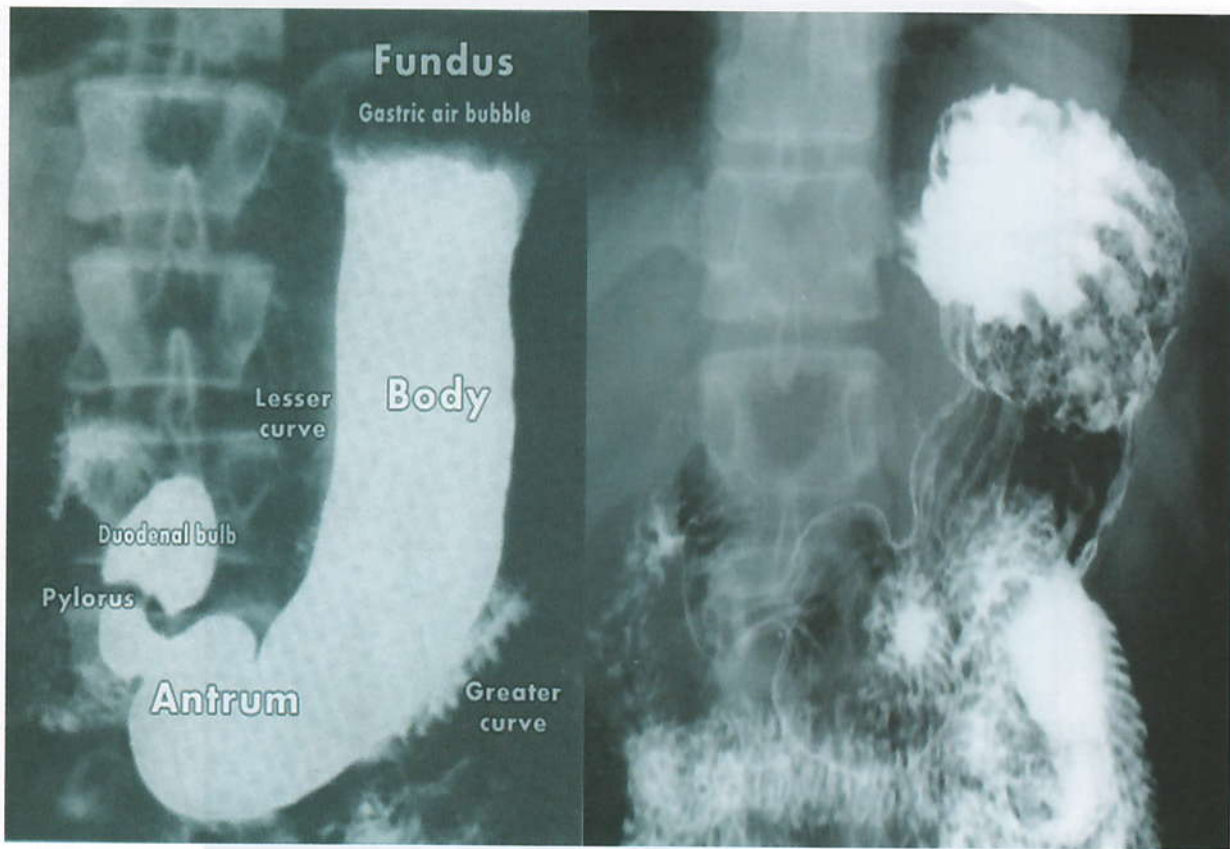




# **Stomach & Duodenum Radiology**



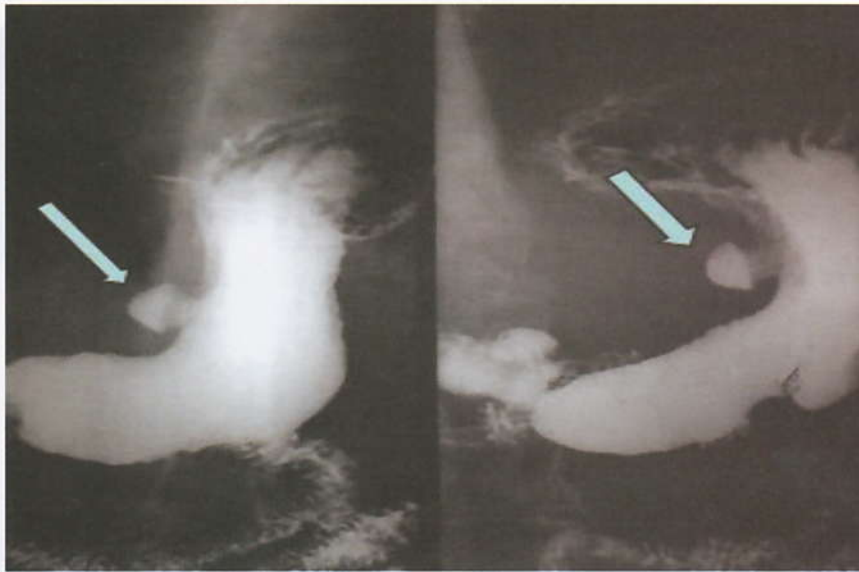
# Normal Stomach & Duodenum



## Normal Barium meal

- Normal Barium meal in standing position. patient must be fasting 6-8 hours before Ba meal.
- This is known because air in the stomach is present at the fundus (gastric air bubble)
- In this position we look for return of barium to the oesophagus, which is called gastro-oesophageal reflux.
- This is a normal Barium meal where there is no reflux.
  - \* duodenal cap appears triangular in shape with smooth outline, with a normal feathery appearance of the C-shaped duodenal cap.

# Chronic Benign Gastric Ulcer



**Barium meals showing Chronic gastric ulcers**

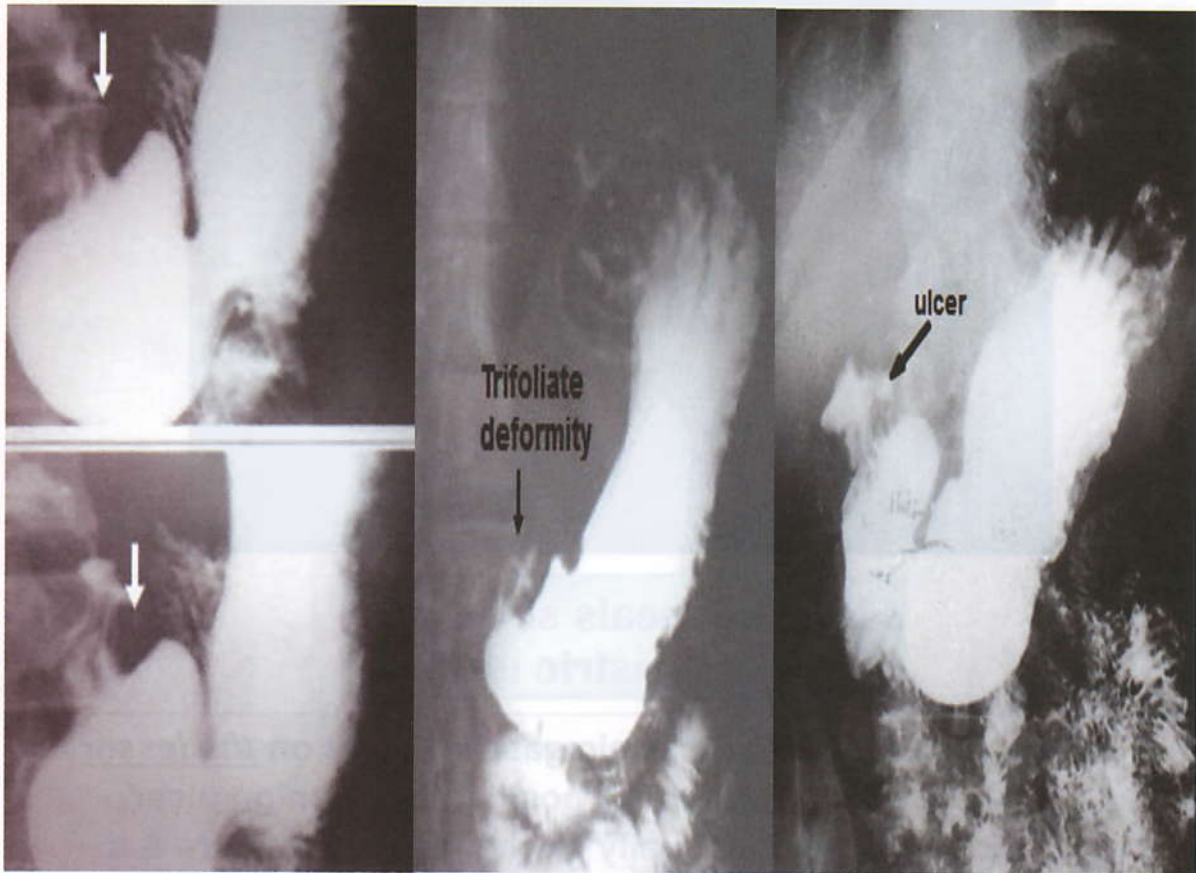
- Barium meals showing chronic gastric ulcers on the lesser curvature, which is the typical position of a benign ulcer.
- Ulcer niche projecting usually on the lesser curvature & a notch in the opposite side on the greater curvature.
- After emptying, a barium flake is seen in the ulcer niche & mucosal folds are seen radiating from it.
- Endoscopy and multiple biopsies are, nevertheless, essential to rule out malignancy.

## Questions (True or false)

1. This lesion at the commonest site ( )
2. Helicobacter infection is the main cause of this condition. ( )
3. Pernicious Anemia can be a predisposing factor ( )
4. Periodic exacerbation of symptoms is a common feature of this disease. ( )
5. Hematemesis is a possible complication of this condition. ( )
6. Barium meal shows ulcer niche ( )
7. Gastric function tests will reveal hyperacidity ( )
8. Multiple biopsies are mandatory on endoscopy to exclude malignancy. ( )
9. Endoscopy is the investigation of choice ( )
10. Vagotomy & drainage is the main line of treatment. ( )
11. Partial gastrectomy can be a line of treatment ( )



## Chronic Duodenal Ulcer



### Barium meals showing chronic duodenal ulcers

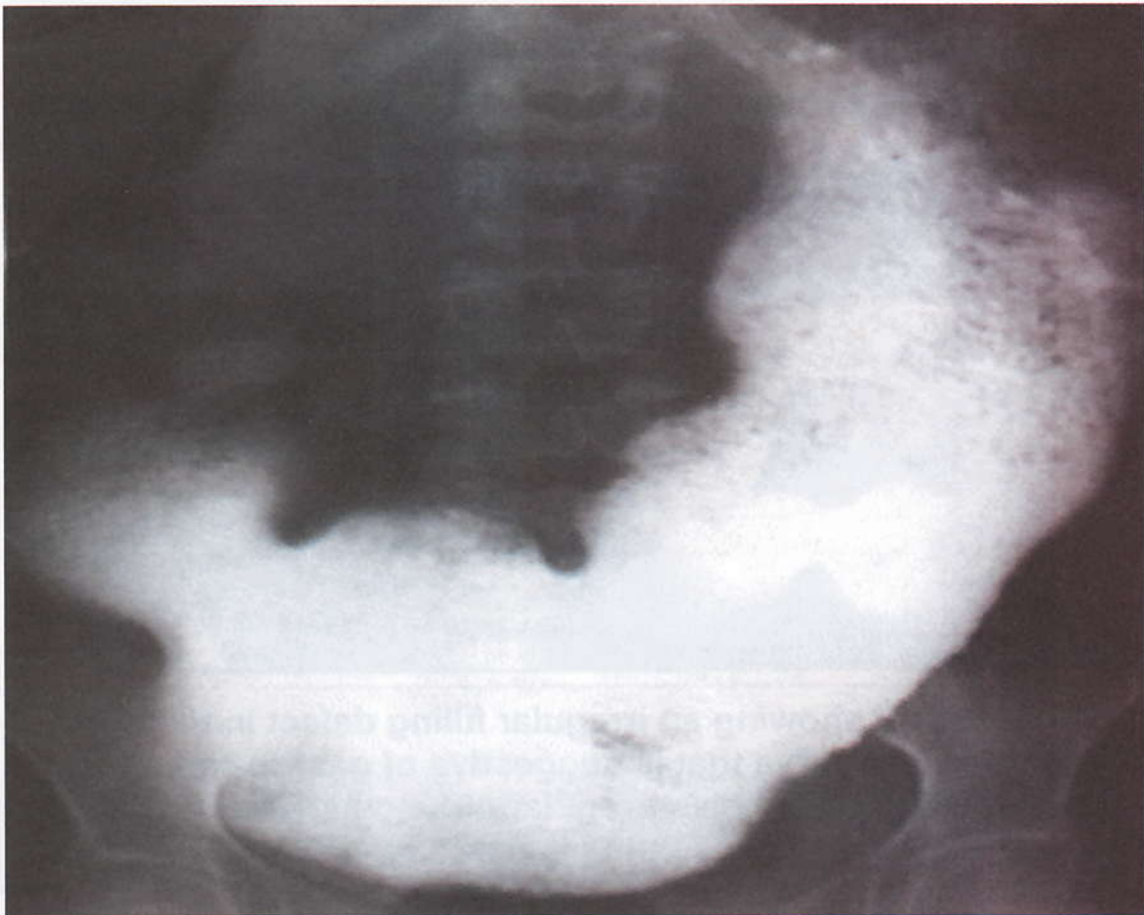
- Barium meal showing persistent ulcer crater in the first part of duodenum

### Questions (True or false)

- This is x-ray is suggestive of chronic duodenal ulcer ( )
- This study was done while the patient is standing up ( )
- The underlying cause could be Zollinger Ellison syndrome ( )
- Hyperacidity is the main underlying cause ( )
- This patient may present with vomiting and chest pain ( )
- Hematemesis is a possible complication ( )
- Complicated cases may present with acute abdomen ( )
- Endoscopy and biopsy is needed for exclusion of malignancy ( )
- Endoscopy is more accurate in the diagnosis of this condition ( )
- If uncomplicated medical treatment is the treatment of choice ( )



# Pyloric Stenosis



## Pyloric stenosis

- Barium meal showing a hugely enlarged stomach that extends down to the pelvis (with soup dish appearance).
- The usual cause is fibrosis of a chronic duodenal ulcer

## Questions (True or false)

22. This study is contraindicated in patient allergic to iodine ( )
23. The dye used in this study is Gastrografin ( )
24. The underlying cause is fibrosed duodenal ulcer. ( )
25. This patient may present by carpo-pedal spasm. ( )
26. This patient may present with acute abdominal pain ( )
27. This patient may present by pulsatile epigastric swelling. ( )
28. Hypocalcaemia and hyponatremia are possible complications ( )
29. This condition may lead to metabolic alkalosis. ( )
30. Vagotomy & gastro-jejunostomy is the main line of treatment. ( )
31. The principle line of treatment is Ryle suction and antacids ( )
32. Immediate surgery is required for treatment of this condition ( )



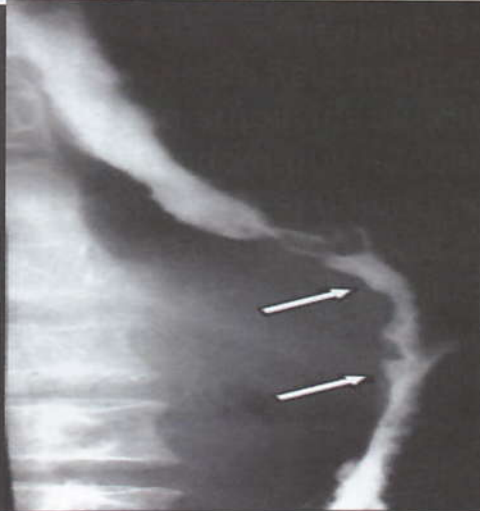
# Cancer Stomach

■ It may present as:

## A. Irregular Filling Defect

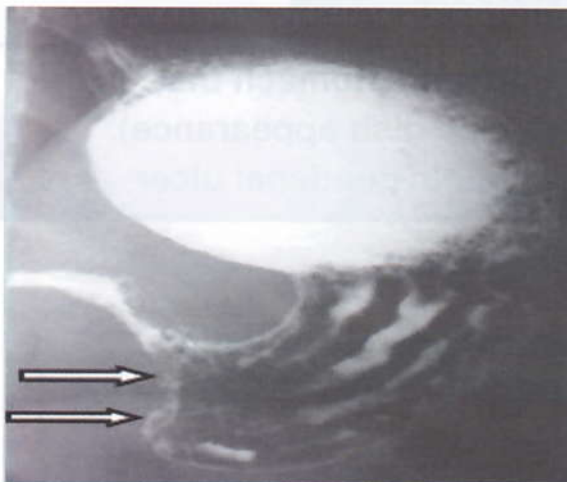


## B. Linitis Plastica

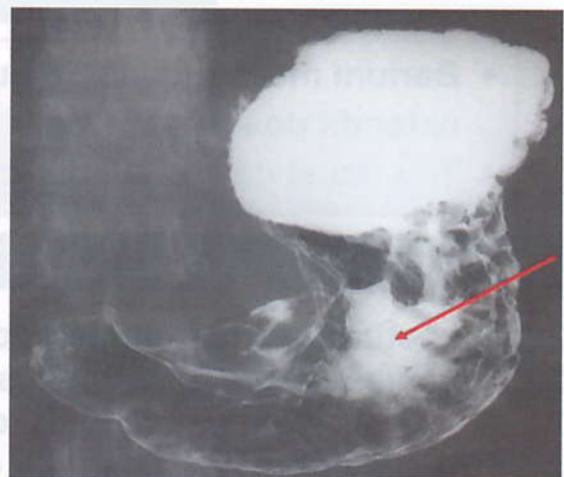


- Barium meal showing an irregular filling defect in the upper part of lesser curve that is suggestive of gastric cancer
- Barium meal that shows irregular diffuse narrowing of the stomach (Linitis Plastica) this is a rare type of gastric cancer

## C. Narrowing of pylorus



## D. Malignant Ulcer Niche



- Barium meal examinations that show irregular narrowing of the pylorus that are caused by gastric cancer. This is the commonest site of carcinoma of the stomach
- Ulcer causing malignant ulcer niche anywhere in stomach particularly in the antrum or greater curvature, on top of a mass (not projecting beyond stomach margin), without mucosal folds radiating from the ulcer & without notch.

**Questions for A, B & C**

- 33. This study is a barium meal with the head down position ( )
- 34. There is an irregular filling defect at the pyloric region ( )
- 35. This lesion at the commonest site ( )
- 36. The underlying cause is malignant neoplasm ( )
- 37. The patient in early stages complains of non-specific symptoms. ( )
- 38. The patient may present with symptoms of pyloric obstruction. ( )
- 39. This patient may complain from acute upper abdomen ( )
- 40. The patient can present with bilious vomiting ( )
- 41. Endoscopy & biopsy is the investigation of choice. ( )
- 42. Subtotal radical gastrectomy is the main line of treatment in early cases. ( )
- 43. Gastro-jejunostomy is a line of treatment in complicated cases. ( )
- 44. Radiotherapy is the best line of treatment ( )

**Questions for D**

- 45. Atrophic gastritis is a major predisposing factor ( )
- 46. Gastric function tests will reveal achlorhydria ( )
- 47. This patient present with dyspepsia related to meals ( )
- 48. This condition can present clinically with hematemesis ( )
- 49. C.T. abdomen is needed to help in the diagnosis ( )
- 50. Endoscopy and biopsy is the investigation of choice ( )
- 51. Chemotherapy is the best line of treatment ( )
- 52. This patient may present with recent dyspepsia anorexia and weight loss ( )
- 53. Helicobacter pylori can be a predisposing factor ( )
- 54. Total radical gastrectomy is the treatment of choice in advanced cases ( )
- 55. Vagotomy and gastrojuenostomy is the best line of treatment for complicated cases ( )



## Stomach Key answer

|    |       |
|----|-------|
| 1  | True  |
| 2  | True  |
| 3  | FALSE |
| 4  | FALSE |
| 5  | True  |
| 6  | True  |
| 7  | FALSE |
| 8  | True  |
| 9  | True  |
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| 27 | FALSE |
| 28 | True  |

|    |       |
|----|-------|
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| 43 | True  |
| 44 | FALSE |
| 45 | True  |
| 46 | True  |
| 47 | FALSE |
| 48 | True  |
| 49 | True  |
| 50 | True  |
| 51 | FALSE |
| 52 | True  |
| 53 | True  |
| 54 | FALSE |
| 55 | FALSE |

## Important points & tweets based on our questions

**Q1:**

- Type I in the body of stomach on lesser curvature ( 60%) associated with gastritis and acid hyposecretion .

**Q4:**

- Symptoms : pain ↑ with food , ↓ by fasting & vomit , nausea & vomiting are features of the disease, ↓ body weight, Periodicity is less marked than duodenal ulcer , although the loss of which may indicate malignancy .

**Q7:**

- May show decreased acidity but ulcer cause is the atrophied mucosa.

**Q8:**

- At least 4 biopsies from the ulcer by endoscope is needed to exclude malignancy , GU away from lesser curvature is highly suspicious of malignancy
- GU showing no attempt of healing after 6 weeks should be considered malignant.

**Q10:**

- Endoscopy is the most important investigation & biopsy to exclude malignancy, Ttt is mainly medical , but at 1<sup>st</sup> exclude the malignancy .

**Q13:**

- known from the place of gastric air bubble , if at fundus of stomach so the patient is erect, if at antrum it is in trendelenberg position.

**Q14:**

- ZES rare condition either a pancreatic tumor secretes excessive gastrin hormone, or hyperplasia of G –cells at antrum...causing hyperacidity.

**Q15:**

- Helicobacter pylori found in 85% of duodenal, & 75% of gastric ulcers, produce urease , ↑ ammonia ↑ alkalinity at antrum with ↑ gastrin production

**Q16:**

- Duodenal to gastric ulcer is 25:1 , common in the 1st part at posterior wall
- Ulcer pain is deeply seated in epigastrium occur few hours after meals usually at night 2-3hrs after last meal relieved BY eating and antacids , nausea & vomiting are not common , periodicity .

**Q19:**

- The best investigation is endoscopy , Biopsy from ulcer is not essential for diagnosis unlike endoscope
- Investigation for H.pylori are breath test, serology and culture from biopsy material

**Q22:**

- This study is done by Gastrograffin so not contraindicated in patient with iodine allergy.

**Q 24:**

- Caused by excessive fibrosis around duodenal or ajuxtapyloric ulcer resulting in gastric outlet obstruction . NOT A SURGICAL EMERGENCY

**Q25:**

- Usually there is serious electrolyte imbalance including hyponatremia, hypokalemia, alkalosis and hypocalcemia → tetany

**Q26:**

- Vomiting of copious amount of dark fluid characteristically in the evening
- NON-BILIOUS Vomiting , projectile and contain undigested food of previous day



**Q30:**

- The treatment directed to correction of the general condition of the patient, chest physiotherapy and correction of electrolyte imbalance
- Truncal vagotomy and gastro-jejunostomy is the standard operation ,
- The stenosed pylorus does not allow passage of tip of the endoscope
- Ba meal → soap dish appearance

**Q35:**

- Most common site → pyloric antrum ( 60%)

**Q37:**

- Any patient above 40 complaining of dyspepsia should be fully investigated for the possibility of stomach cancer , Aprticular dislike to meat is described with stomach cancer , Anemia in the elderly should raise the possibility of malignancy .

**Q40:**

- If obstructing case..  
in cardia → dysphgia in pylorus → non-billious vomiting

**Q41:**

- Endoscopy is the most accurate investigation because direct visualization of the tumor and take biopsy
- Ba meal is the most accurate for pyloric growths
- Barium study should always include views taken in thee trendelberg position to detect growth situated in the cardia or fundus
- CT more accurate than sonar in detection of LNs involvement

**Q44:**

- NOT Radiotherapy

**Q45:**

- Type A→ pernicious anemia associated with parietal cell Abs, acid hyposecretion and Vit.B12 deficiency
- Type B → associated with normal level of acid and Vit.B12.
- Both types associated with high risk of malignancy .

**Q51:**

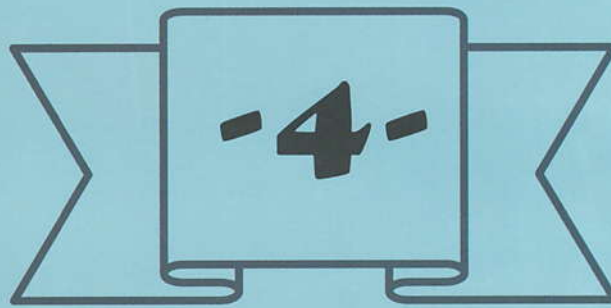
- For early cases, radical surgery with safety margin 5cm above the tumor & 1.5 cm from duodenum below it , for non-curable cases palliative resection is done, but chemotherapy & radiotherapy are not of benefit for this cases.

**Q55:**

- oesophagojejunostomy, or gastrojejunostomy or palliative gastrectomy is done.

**N.B.:**

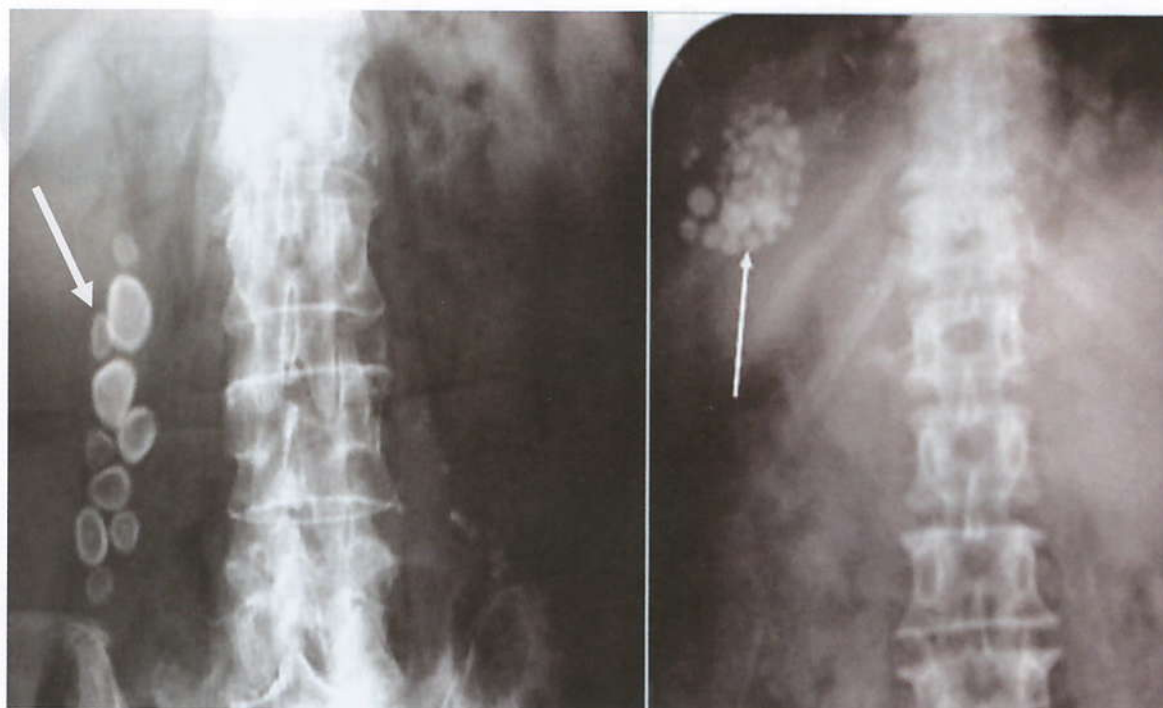
- For linitis plastica it is not SPECIFIC FOR blood group O , GASTRECTOMY IS A RISK FACTOR.



# Hepato - Biliary Radiology



## Plain AP x-ray Right Hypochondrium



### Multiple stones gall bladder x-ray

- Only 15% of GB stones are radio-opaque.
- The majority are radiolucent.
- This is in contrast with urinary stones that are mostly opaque
- N.B: Normal gall bladder is not seen in plain x-ray.

### Questions (True or false)

1. This is an oral cholecystography ( )
2. This study is contraindicated in cases of acute abdomen ( )
3. May be seen in patients less than 40 years old ( )
4. The underlying pathology is mixed stones ( )
5. The chemical nature of these stones is mainly cholesterol ( )
6. The stones seen are inside the gall bladder ( )
7. This is the commonest type of gall stones ( )
8. This patient is suffering now from acute cholecystitis ( )
9. They may cause obstructive jaundice ( )
10. Ultra-sound is the investigation of choice of this condition ( )
11. Oral cholecystography may be helpful in the diagnosis if radiolucent stones ( )
12. Lateral view film can confirm the diagnosis ( )
13. The treatment of this condition is mainly medical ( )
14. Medical dissolution is the treatment of choice if asymptomatic ( )



# Oral Cholecystography (OCG)



## GB stones

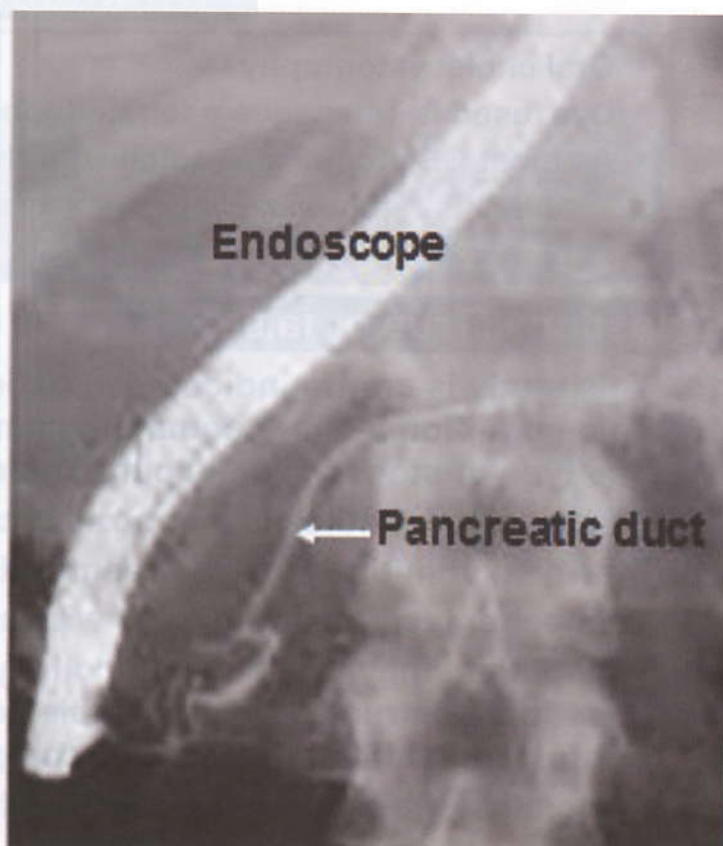
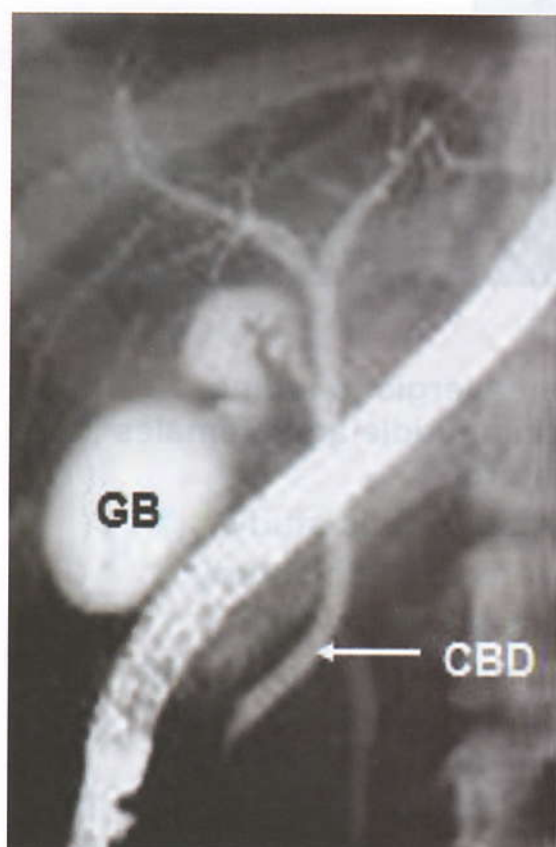
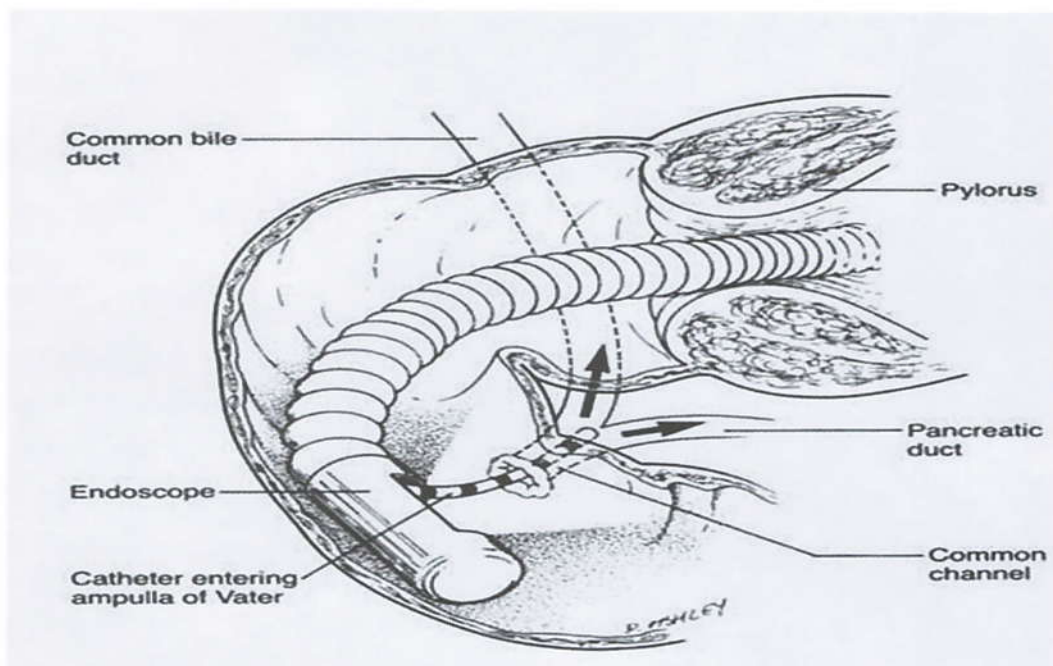
- Oral cholecystography
- Dye used is Telepaque = tetraiodophenol-phethaline
- As most GB stones are radiolucent they appear as filling defects
- This test is rarely used in modern practice as it has been superseded by U/S

## Questions (True or false)

15. This study is contra indicated in patient allergic to iodine ( )
16. This condition is more commonly among middle aged females ( )
17. The type of stones seen is pure cholesterol ( )
18. Obstructive jaundice is a contraindication for this study ( )
19. Diarrhea, vomiting and gastroenteritis are CI for this study ( )
20. This patient is presenting now with acute cholecystitis ( )
21. This patient may present with colicky pain in upper abdomen ( )
22. Intestinal obstruction is a possible complication ( )
23. Acute pancreatitis is a possible complication ( )
24. Abdominal ultrasound can confirm the diagnosis ( )
25. HIDA scan can be done in acute inflammation ( )
26. Chemical dissolution is the treatment of choice of this condition ( )
27. Cholecystostomy is the surgical treatment of choice ( )
28. Cholecystectomy is reserved after failure of medical treatment ( )
29. ERCP can be a therapeutic option for this condition ( )

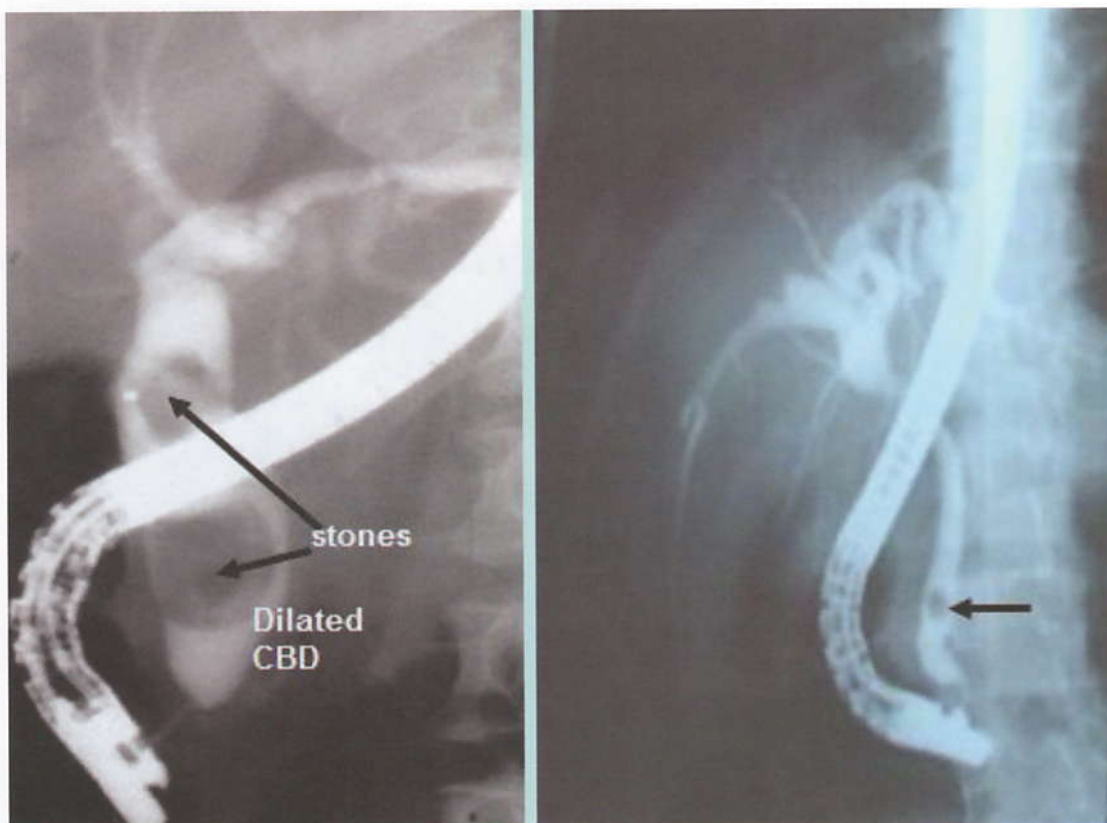


# ERCP



**Normal ERCP**

# ERCP



## CBD stones

- ERCP Endoscopic Retrograde CholangioPancreatography
- Radiographic diagnosis is CBD stones
- Sphincterotomy and stone removal can be done in the same session.
- Large stones require fragmentation before removal

## Questions (True or false)

30. There is a missed stone in the common bile duct ( )
31. There is an endoscope visualized in this study ( )
32. Bleeding tendency is a contraindication for this procedure ( )
33. Bleeding tendency can be corrected by intravenous vitamin K ( )
34. This patient may present with epigastric pain, referred to back ( )
35. This patient can present with jaundice and upper abdominal pain ( )
36. Pancreatitis is a possible complication of this procedure ( )
37. Abdominal U/S is an essential investigation before this procedure ( )
38. The gall bladder is not visualized because it was removed ( )
39. Endoscopic removal of stones can be a line of treatment ( )



# ERCP



## Malignant obstruction

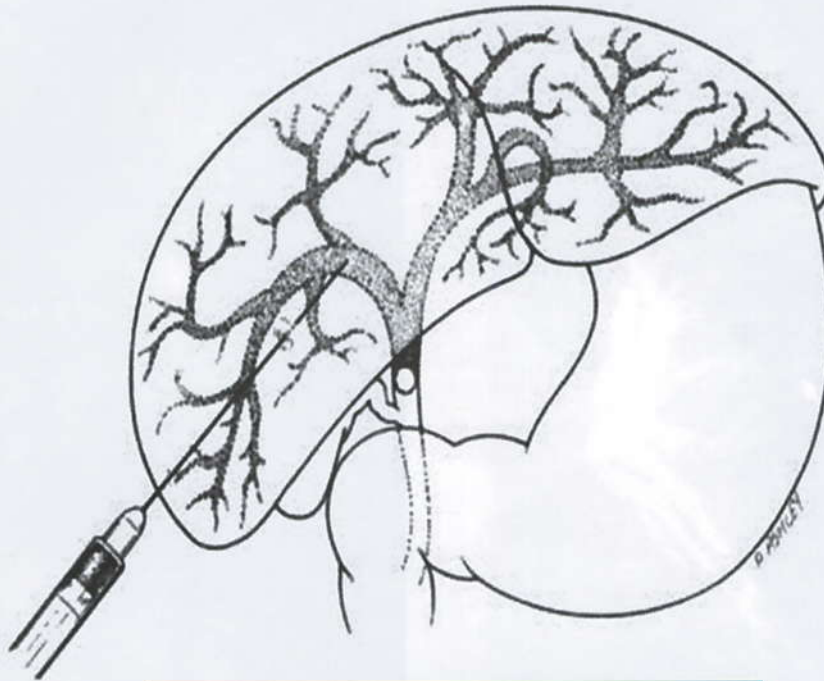
- ERCP
- CBD is transversely cut at level of obstruction.
- This is possibly a malignant obstruction
- In jaundiced patients ERCP should be preceded by U/S examination and by checking prothrombin time and correcting it whenever needed

## Questions (True or false)

40. Malignant neoplasm could be the cause of this condition ( )
41. This study can be complicated with cholangitis ( )
42. The pancreatic duct show stenosis without proximal dilatation ( )
43. Chronic pancreatitis can be a differential diagnosis ( )
44. Bleeding tendency is a contraindication for this study ( )
45. C T abdomen can help in the diagnosis ( )
46. This patient may present with epigastric pain, referred to the back ( )

# PTC

## Percutaneous Trans hepatic Cholangiography



**PTC**

- PTC is even more invasive than ERCP
- In jaundiced patients PTC should be preceded by U/S examination and by checking prothrombin time and correcting it whenever needed
- PTC is particularly useful in diagnosing high biliary obstruction, e.g., high carcinoma of bile ducts or stricture of bile ducts that follows injury during a cholecystectomy



# PTC

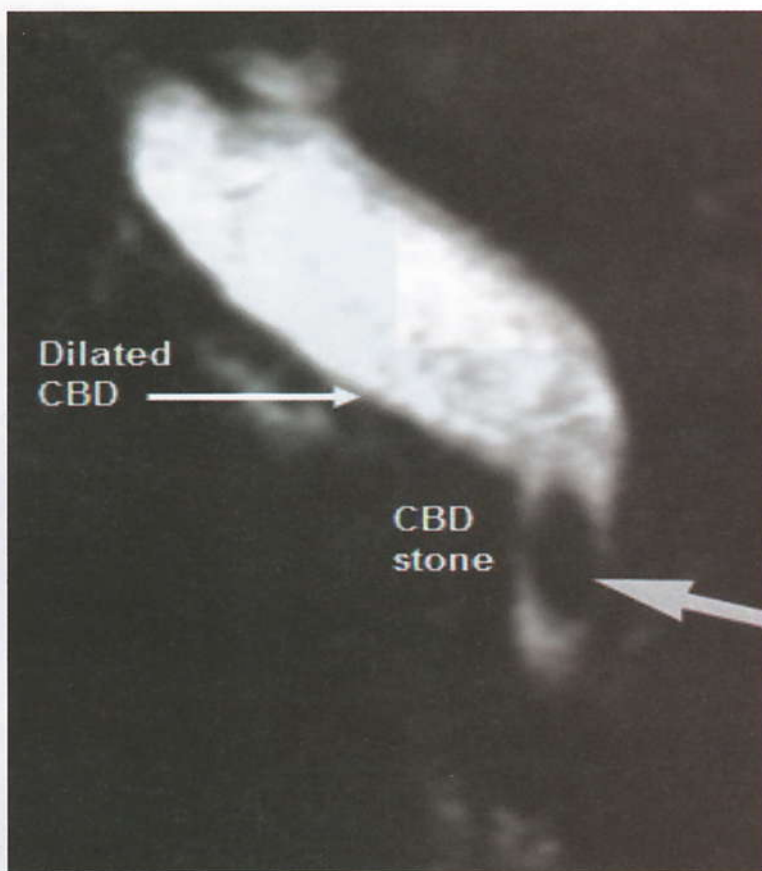


- PTC that show the level of obstruction and proximal dilatation of intrahepatic bile ducts

## Questions (True or false)

- |                                                                |     |
|----------------------------------------------------------------|-----|
| 47. This x-ray shows dilated intra-hepatic bile ducts          | ( ) |
| 48. The gall bladder is visualized containing stones           | ( ) |
| 49. There is a stone in the common bile duct                   | ( ) |
| 50. It is indicated with Hypo-prothrombinemia                  | ( ) |
| 51. Bleeding tendency is due to hypo-prothrombinaemia          | ( ) |
| 52. Vitamin K tablets are given few days before this procedure | ( ) |
| 53. This patient is presenting with dark urine and pale stools | ( ) |
| 54. Serum urea and creatinine is an essential investigate      | ( ) |
| 55. Surgery for the obstruction is the main line of treatment  | ( ) |
| 56. Insertion of a stent can be a line of treatment            | ( ) |

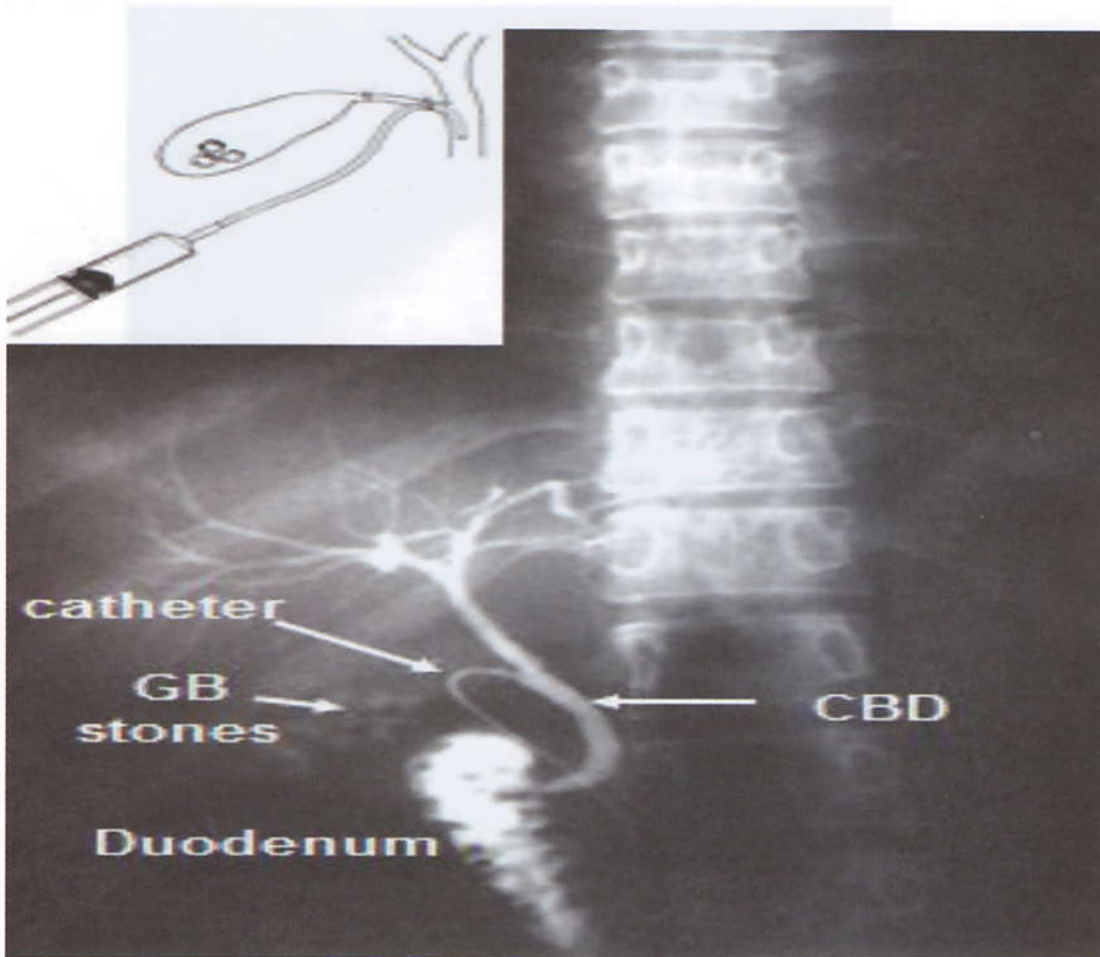
# MRCP



- **MRCP Magnetic Resonance Cholangio-Pancreatography**
- **This is a form of magnetic resonance imaging**
- **Non-invasive, no contrast used, but computer generates the image as shown (CBD stone)**
- **Unlike ERCP this test is non-therapeutic**



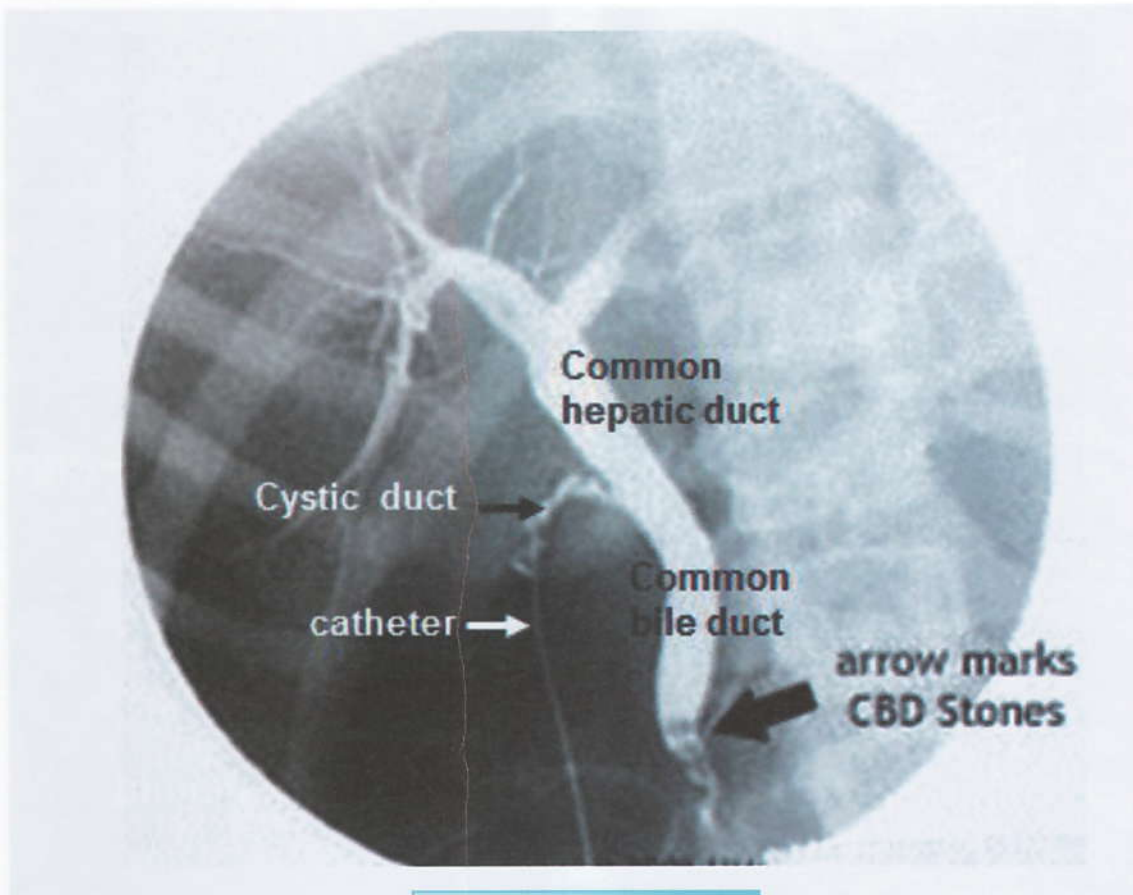
# Intraoperative cholangiogram (IOC)



## Intraoperative cholangiogram

- Normal Intraoperative cholangiogram (IOC).
- In some cases, during surgery, where bile duct stones are suspected a fine catheter is introduced through the cystic duct before dividing it. A contrast material is injected.
- In this normal case:
  - There are no filling defects (stones) in bile ducts
  - Bile ducts (both intra and extrahepatic are of normal diameter
  - The contrast material enters the duodenum, which has a feathery appearance caused by its mucosal folds

# Intra-operative Cholangiography

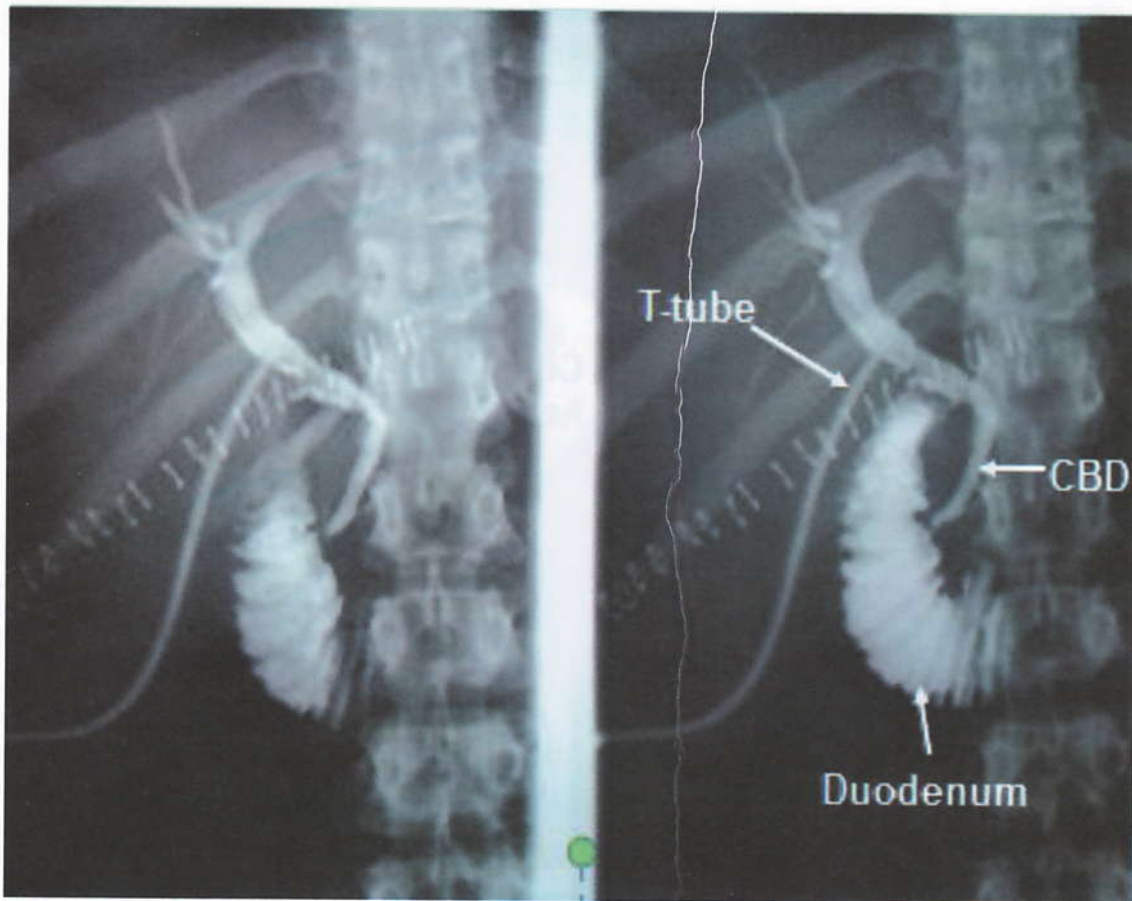


## CBD stones

- Common bile duct stones discovered by cholangiography done at surgery for gall bladder removal



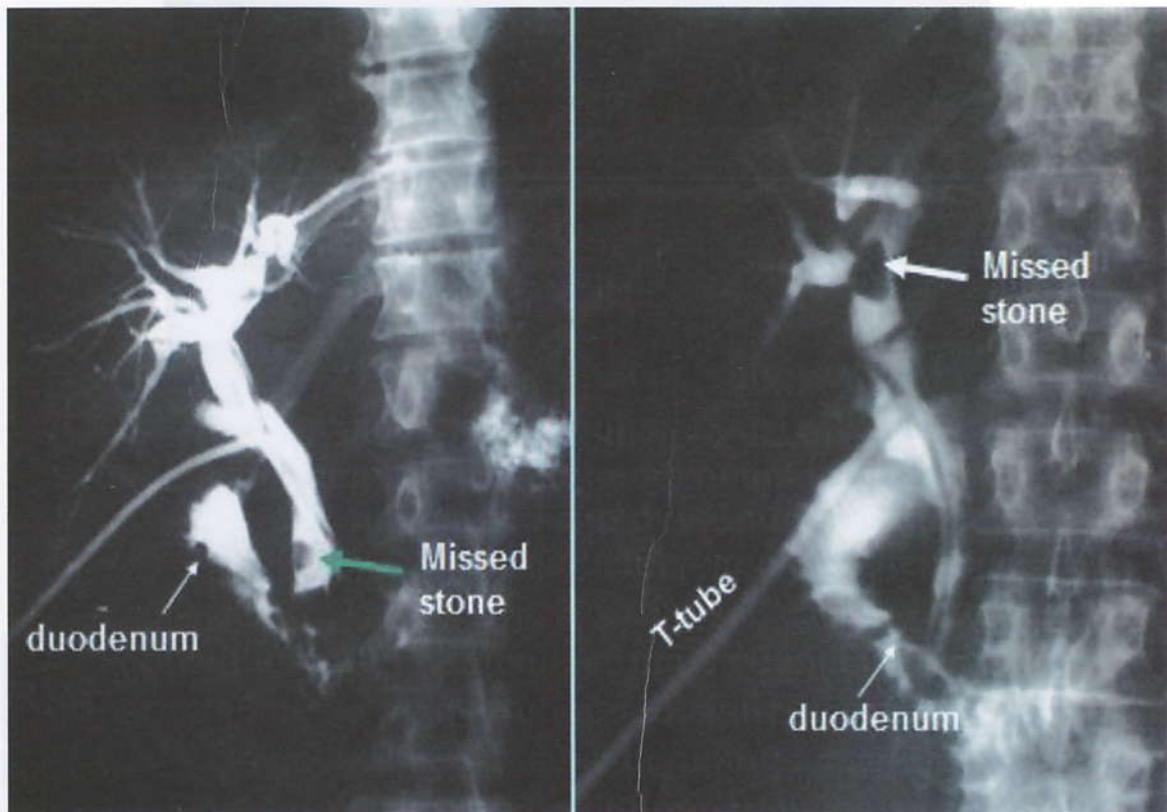
## T-tube cholangiogram



### Normal T-tube cholangiogram

- Normal T-tube cholangiogram
- If the CBD is opened during surgery to look for and remove stones it should be closed over a T-tube.
- About 10 days after the operation T-tube cholangiography is done by injecting a contrast material through this tube.
- Look for:
  - Filling defects in bile duct (stones)
  - Free entry of contrast to the duodenum
- In this case there is no abnormality and the tube can be pulled out safely. The resulting hole in bile duct closes spontaneously within 2 days

# T-tube cholangiogram



## Missed stones in CBD

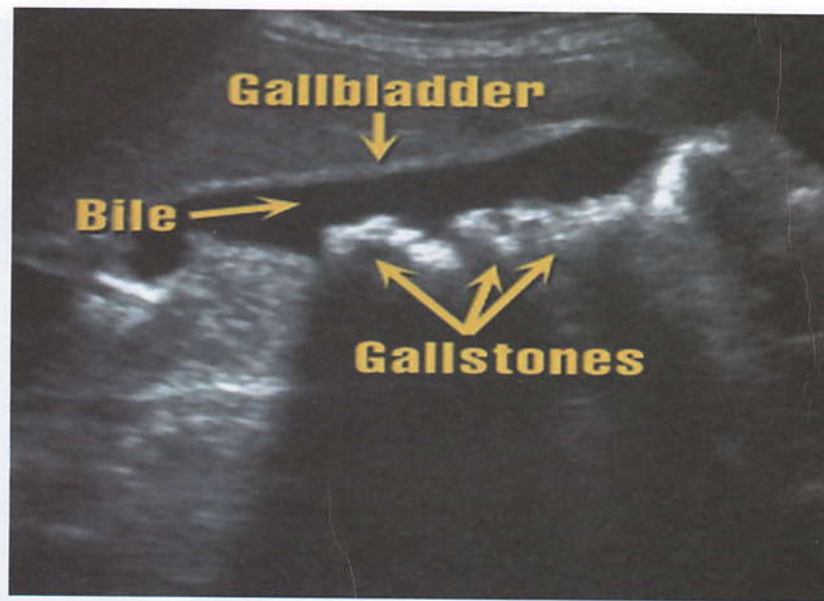
- T-tube cholangiogram
- Missed stones in common bile duct discovered by T-tube cholangiography

### Questions (True or false)

- |                                                                   |     |
|-------------------------------------------------------------------|-----|
| 57. It is 2 days post-operative investigation                     | ( ) |
| 58. Gall bladder not seen dye not reach                           | ( ) |
| 59. No filling defect                                             | ( ) |
| 60. The dye descend to duodenum                                   | ( ) |
| 61. It can be removed early                                       | ( ) |
| 62. The dye used is Urographin                                    | ( ) |
| 63. Free flow of the dye to duodenum can be seen in this x-ray    | ( ) |
| 64. There is marked dilatation of the intra hepatic biliary ducts | ( ) |
| 65. The gall bladder is not visible as the dye didn't reach it    | ( ) |
| 66. Removal of the tube can be done safely in this patient        | ( ) |
| 67. Removal of the tube now can lead to biliary fistula           | ( ) |
| 68. This patient may present with dark stools and pale urine      | ( ) |
| 69. This patient can present with obstructive jaundice            | ( ) |
| 70. The operation done for this patient was Cholecystectomy       | ( ) |

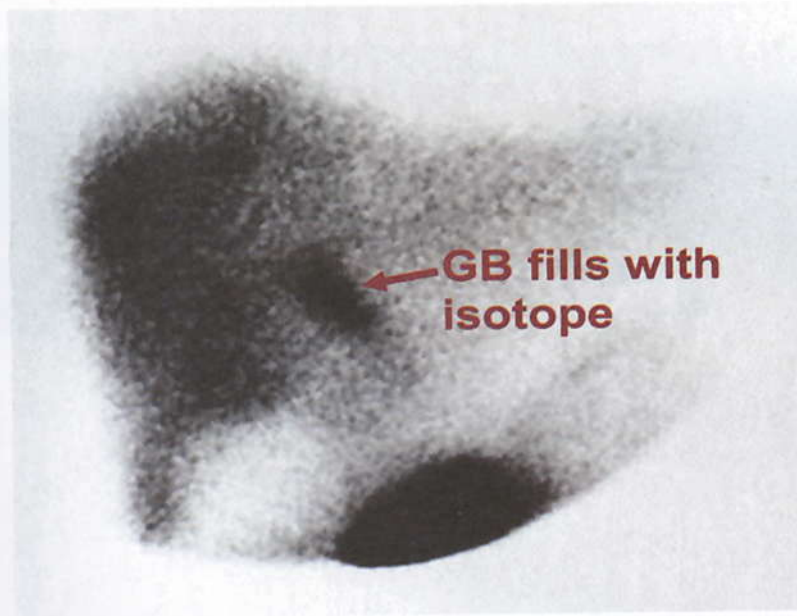


# Ultrasound



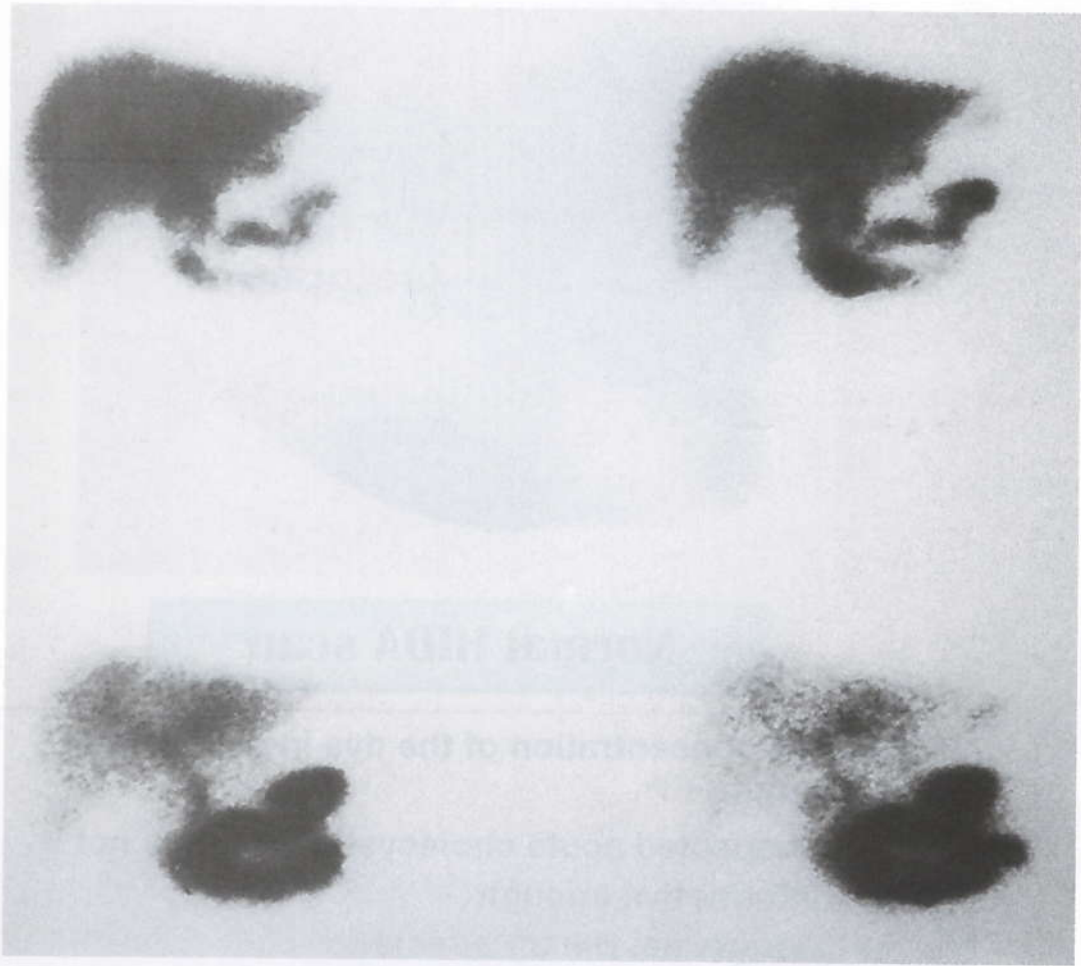
## Gall bladder stones

- Abdominal ultrasound
- Gall bladder stones show as opacities that cast a posterior acoustic shadow
- U/S has about 98% accuracy in detecting GB stones
- U/S detects only about 30% of CBD stones.
- It can however show duct dilatation which suggests their presence and calls for an ERCP confirmation and removal

**HIDA scan (Hepatic Imino Diacetic Acid scan)****Normal HIDA scan**

- Seen as concentration of the dye in gall bladder.
- Indications
  - ✓ Suspected acute cholecystitis if U/S is not informative enough
  - ✓ Congenital Biliary atresia



**HIDA scan (Hepatic Imino Diacetic Acid scan)****Acute cholecystitis**

- GB does not fill with isotope because its neck is obstructed, likely by a stone.
- The diagnosis is acute cholecystitis

**Questions (True or false)**

71. US is the investigation of choice of this condition. ( )
72. This condition is commonly seen among middle aged females. ( )
73. This condition may be complicated by acute pancreatitis. ( )
74. Lateral view film is important to differentiate a gall stone seen in AP x-ray from renal stone. ( )
75. Telepaque tablets are taken 12 hours before oral cholecystography. ( )
76. Porcelain gall bladder is a precancerous condition. ( )
77. Treatment of this condition is mainly medical. ( )

# Hepatobiliary Key answer

|    |       |
|----|-------|
| 1  | FALSE |
| 2  | FALSE |
| 3  | True  |
| 4  | True  |
| 5  | FALSE |
| 6  | True  |
| 7  | True  |
| 8  | FALSE |
| 9  | True  |
| 10 | True  |
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| 25 | True  |
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| 27 | FALSE |
| 28 | FALSE |
| 29 | FALSE |
| 30 | FALSE |

|    |       |
|----|-------|
| 31 | True  |
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| 55 | True  |
| 56 | True  |
| 57 | FALSE |
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| 60 | True  |

|    |       |
|----|-------|
| 61 | True  |
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| 67 | True  |
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| 70 | True  |
| 71 | True  |
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| 76 | True  |
| 77 | FALSE |



## Important points & tweets based on our questions

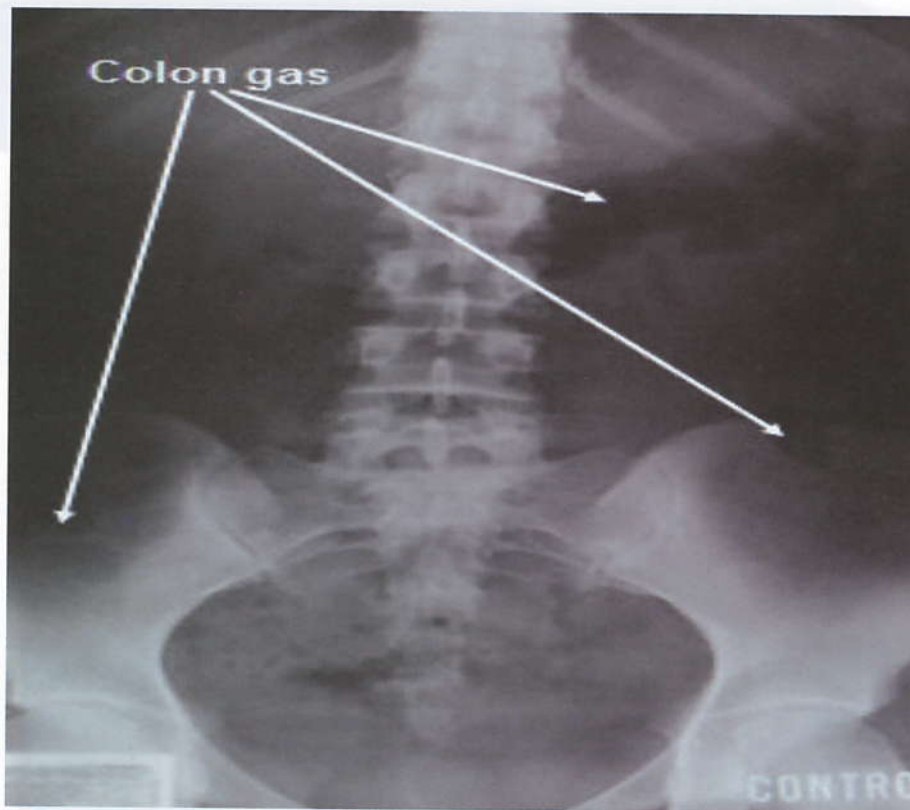
- Q3:** but 20% of cases are women above age of 40 years.  
 • Female to male ratio (3:1), the incidence increase with age .
- Q4:** mixed stones : multiple , faceted , (0.5-2.5 cm )
- Q5:** mixed stones are (60% cholesterol the rest is  $\text{Ca}^{++}$  bilirubinate ,  $\text{Ca}^{++}$  plamitate).
- Q7:** mixed stones accounts for 90% of all calculi , they are radioopaque in 15 5 of cases ) .
- Q8:** most gall stones are silent in 70% of patients , only 2-3% have recurrent biliary colic, 3-5% of symptomatic patients develop complications every year.
- Q9:** Obstructive jaundice due to migration of stones to CBD.
- Q10:** US is the investigation of choice , can detect 98% of cases , shows thickness of the gall bladder wall
- Q13:** standard TTT is cholecystectomy either by open method or laparoscope.
- Q22:** migration of the stones through a fistula to duodenum .. cause a rare complication (gallstones ileus) .. big stone > 2.5 cm , impacted in terminal ileum about 2 feet from ileocaecal valve .
- Q23:** Acute pancreatitis occurs if a stone in lower end obstruct common channel of CBD & pancreatic duct , or only its passage can produce pancreatitis .
- Q25:** HIDA scan, dye is administered iv , secreted by liver then biliary pathway , normally concentrated in GB , if CBD is seen with non-visualization of GB this is diagnostic for acute cholecystitis .. the investigation is not commonly used nowadays .
- Q 28:** standard TTT is cholecystectomy either by open method or laparoscope.
- Q36:** in presence of unrelieved obstruction in the CBD, injection of contrast material may lead to cholangitis or even septicaemia due to increased pressure in the CBD , acute pancreatitis or duodenal perforation .
- Q39:** the procedure can be therapeutic  
 • Sphincterotomy with removal of bile duct stones.  
 • Insertion of a stent to drain malignant obstruction of the duct.
- Q50:** Prerequisites for PTC is:  
 1) normal coagulation ( vit. K given IV few days before the procedure .  
 2) dilated intrahepatic biliary radical detected by ultrasound .
- Q66:** T-tube is inserted in the CBD , the long limb of the tube brought out of the pt , help to drain bile in early postoperative period.  
 • A T-tube cholangiogram performed after closure of CBD to check absence of filling defects ( completion T-tube cholangiography) 10 days after surgery a cholangiogram through the T-tube is done , & if there is no residual stones & there is free flow of contrast to duodenum , the tube is removed .

**-5-**

# **Intestine Radiology**



# Normal Gas Pattern in Intestine



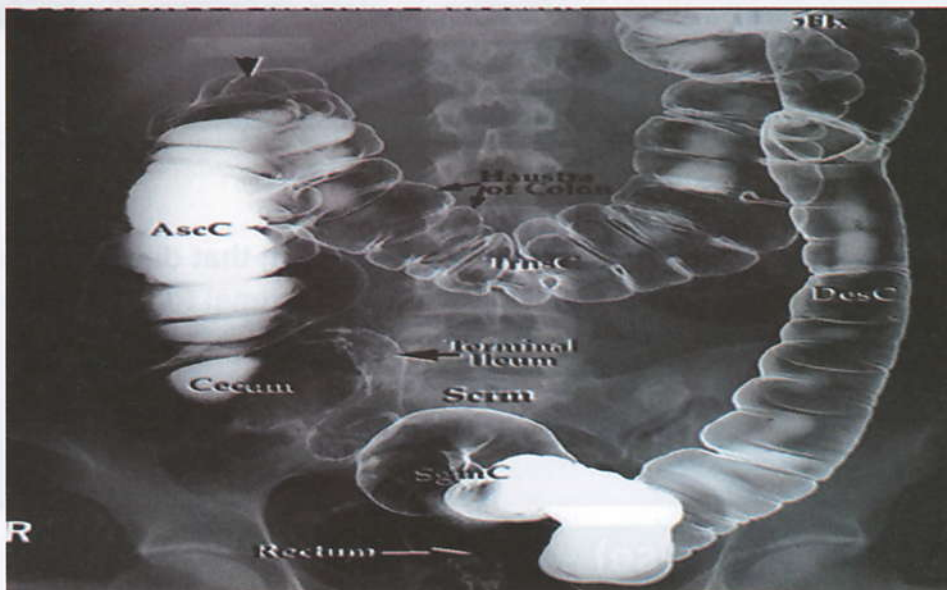
## Normal plain X-ray of abdomen

- Normally the stomach and colon contain gas that can show here, particularly if the patient is not well prepared
- Normally the small intestine contains no gas (or a very minimal amount).
- Small bowel gas shadow may normally show in one or two very small loops at most

## Normal Barium meal and enema



### Normal Barium meal and follow through

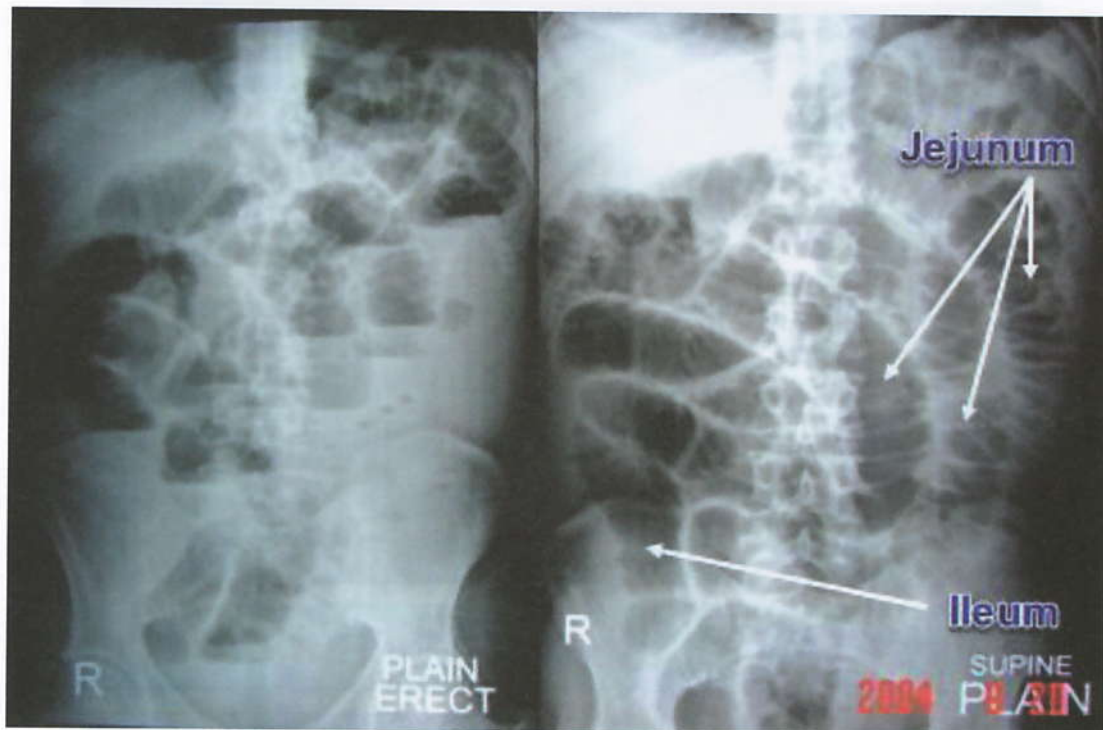


### Normal Barium Enema

- Double contrast Barium Enema Showing filling of the different parts of the colon
- Normal caliber, haustral pattern and mucosa are seen
- This method improves accuracy of detecting minor mucosal changes



# Intestinal Obstruction



## Small intestinal obstruction

- To the left is an erect film (patient is standing).
- It shows multiple air-fluid levels
- To the right is a supine film (patient lying down) that displays the mucosal pattern of distended bowel loops proximal to obstruction.
- Jejunal loops show the pattern of valvulae conniventes.
- Distended ileal loops are featureless.
- There is no visible distended colon (see later).
- This is a case of low small bowel obstruction (diagram)

## Questions (True or false)

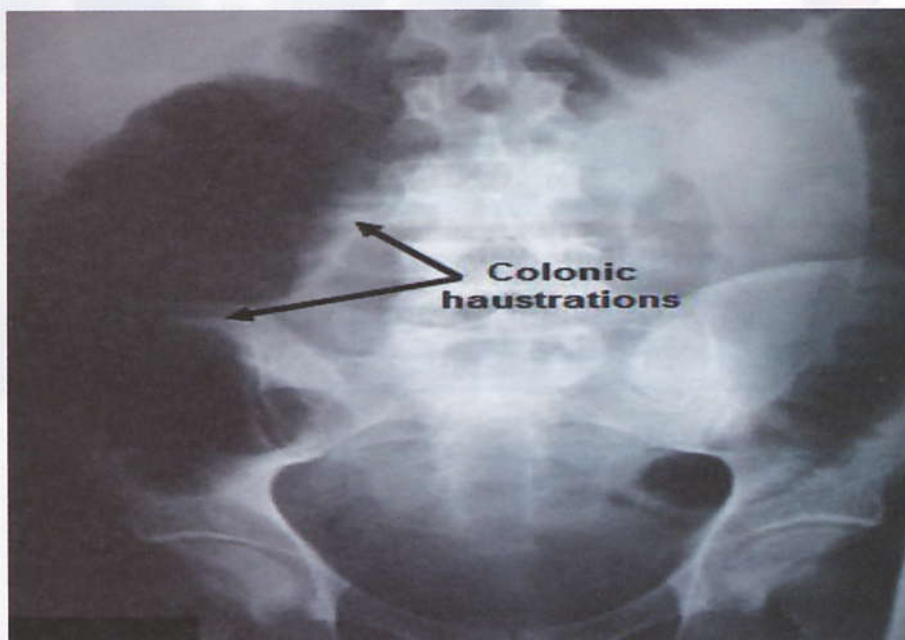
1. This study is barium meal follow through ( )
2. This x. ray shows air under the copula of the diaphragm ( )
3. Etiology of intestinal obstruction may be mechanical or functional ( )
4. Postoperative adhesion could be the underlying cause ( )
5. This patient is presenting with abdominal pain and vomiting ( )
6. Patients with paralytic ileus have frequent intestinal sounds. ( )
7. Patient has painless abdominal distention ( )
8. Patient may presents by greenish vomiting ( )
9. Patient complicated by Hematemesis & Melena ( )
10. Tenderness & rigidity needs urgent laparotomy ( )
11. Initial treatment is by naso-gastric tube and IV fluids ( )
12. The treatment is urgent exploration ( )

# Intestinal Obstruction



## Large intestinal obstruction

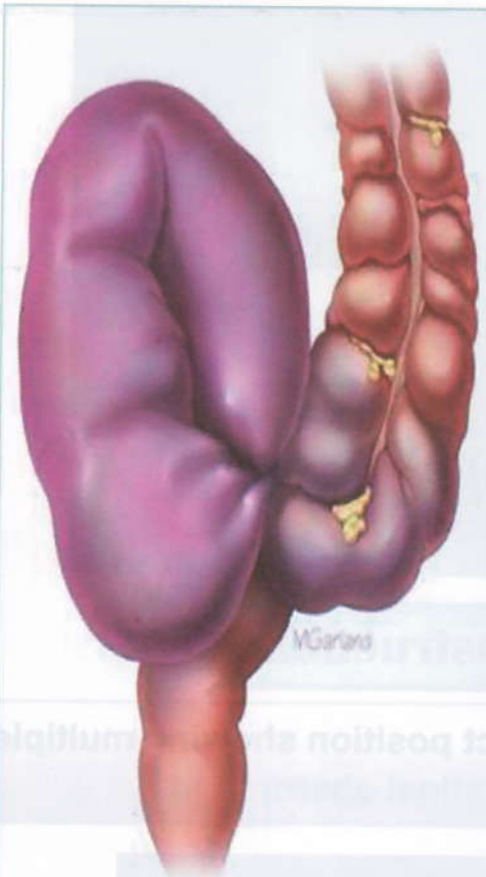
- Plain X-rays of abdomen in erect position showing multiple air-fluid levels that indicate intestinal obstruction



- Plain X-rays of abdomen showing a markedly distended colon down to the sigmoid. Sigmoid colon obstruction
- Unlike the mucosal pattern of jejunum colonic haustration are indentations that do not cross the whole diameter of the colon to the other side



# Sigmoid Volvulus



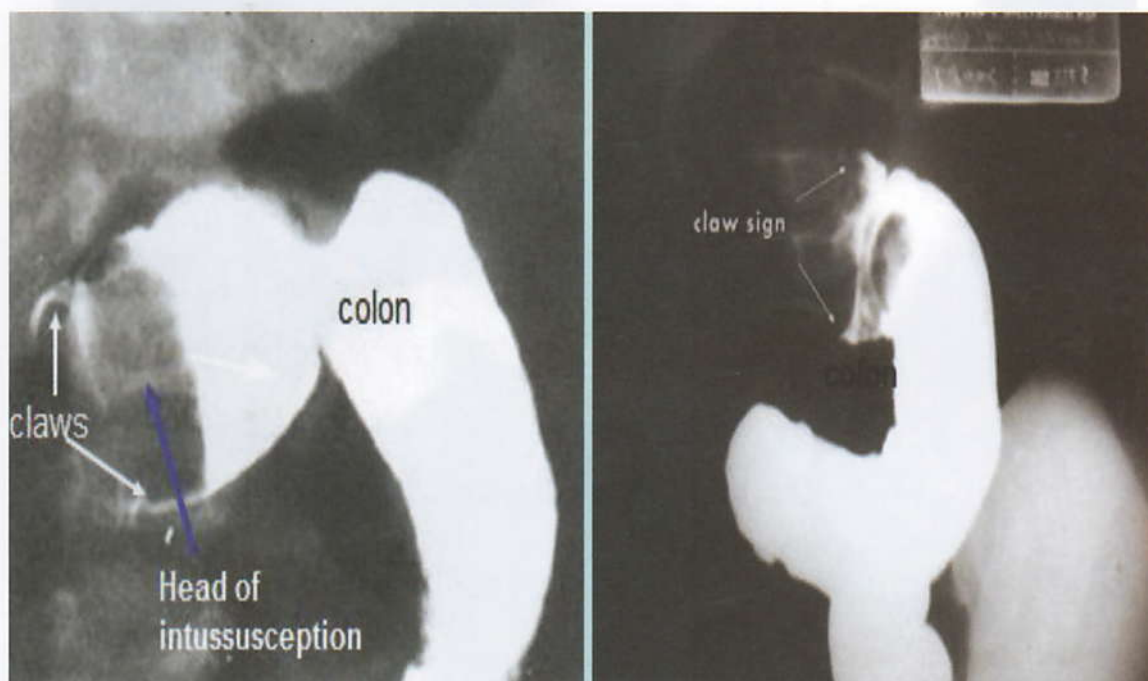
## Sigmoid Volvulus

- Showing dilated sigmoid colon extending from the pelvis to upper abdomen seen as dilated inverted U shaped loop.

### Questions (True or false)

13. This x-ray shows coffee bean sign. ( )
14. This condition is common in young aged persons. ( )
15. Early cases can be treated by colonoscopic decompression. ( )

# Intussusception



## Intussusception

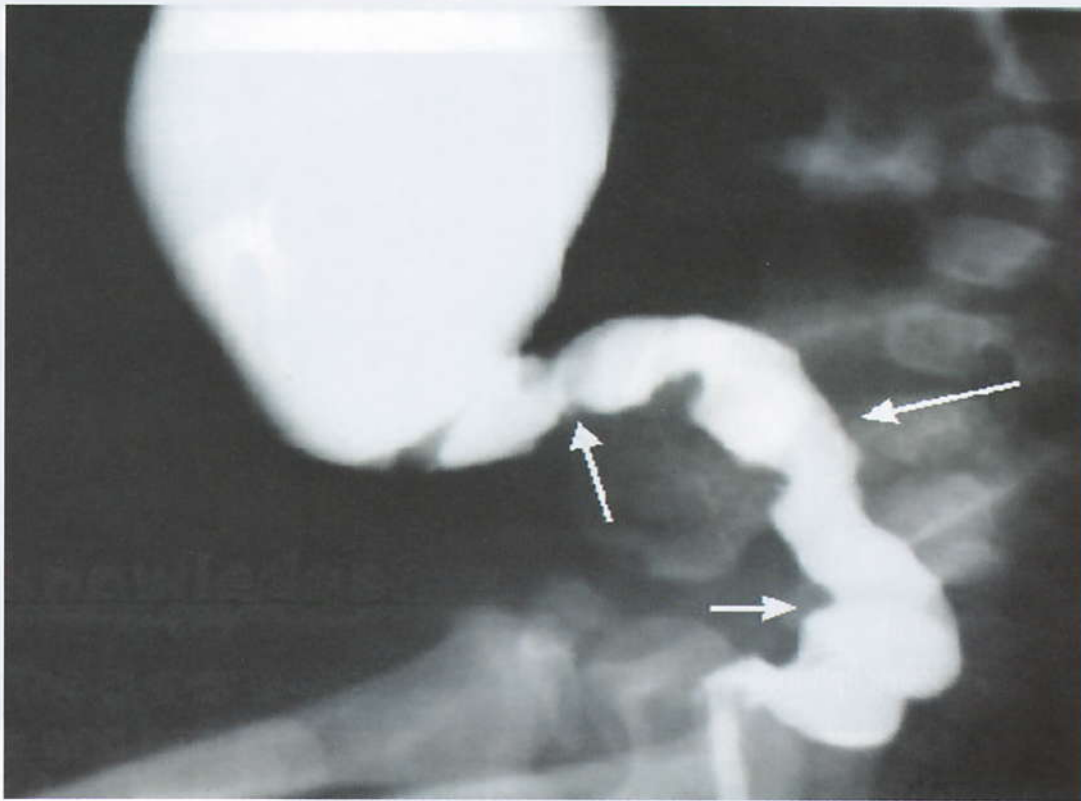
- Barium enema
- The colon is filled with barium until it stops in the area of intussusception seen as mass arresting progress of barium with trace of barium seen on both sides of the mass (claw sign).

### Questions (True or false)

16. This condition is commonly seen in children. ( )
17. Patients are usually infants presented with screaming & withdrawing legs & red currant jelly stools. ( )
18. Palpable abdominal mass can be found on clinical examination ( )
19. This investigation is both diagnostic & therapeutic. ( )
20. This condition may be recurrent. ( )
21. There is a Claw appearance seen at the transverse colon ( )
22. Familial Polyposis can be a predisposing factor ( )
23. This is carcinoma of the transverse colon ( )
24. The infant passes mucous and BPR (red currant jelly stools) ( )
25. Bloody diarrhea can be a clinical presentation ( )
26. Hypocalcaemia and hyponatremia are possible complications ( )
27. Ryle tube + intravenous fluids in the main line of treatment ( )
28. Urgent surgery is the best line of treatment of this patient ( )



## Congenital Megacolon (Hirschsprung Disease)



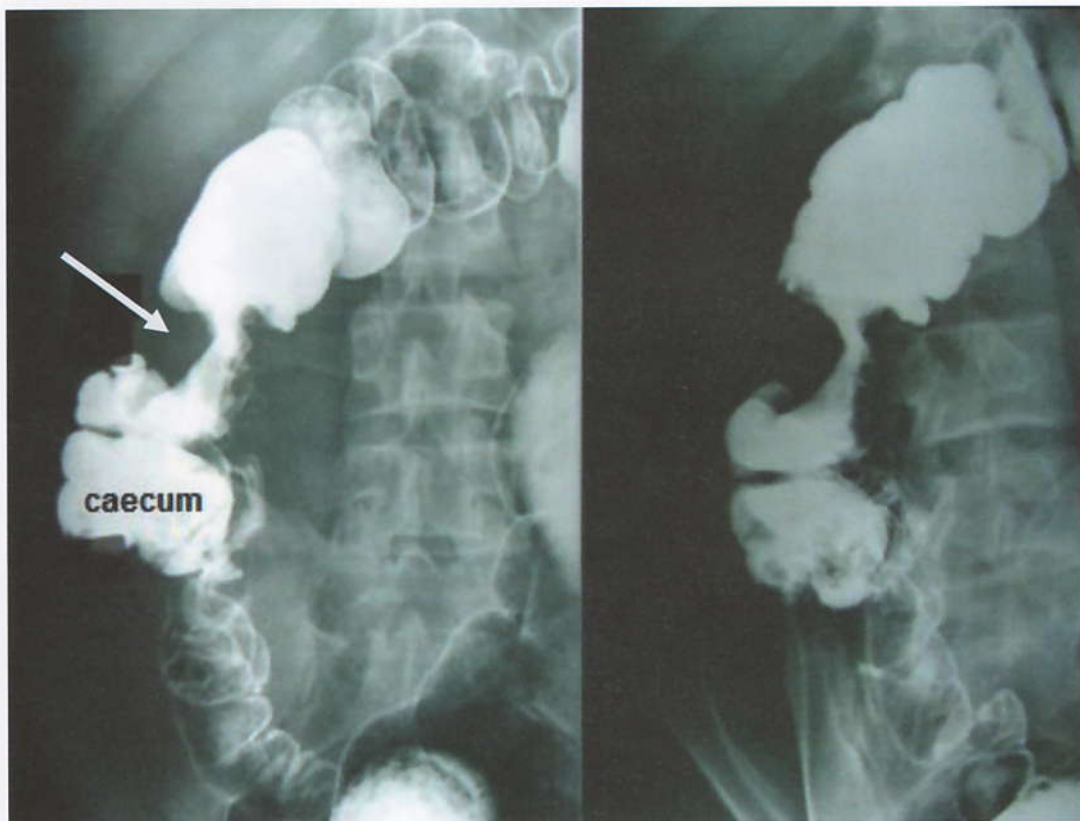
### Hirschsprung's disease

- Barium enema
- Seen as narrow spastic aganglionic segment with dilated proximal normal segment & funneling of the transition zone in between the two segments.

### Questions (True or false)

29. Barium enema should be done for this condition without preparation & with little amount of barium. ( )
30. There are multiple filling defects seen in the rectum ( )
31. There is organic stricture of the anal canal. ( )
32. There underlying cause is congenital ( )
33. Anal atresia is a possible underlying cause ( )
34. Abdominal distention & constipation in infancy are common ( )
35. Gastroenteritis is a complication ( )
36. Abdominal distention and respiratory distress are common ( )
37. Constipation after birth and stunted growth are common ( )
38. Manometric study can help in the diagnosis ( )
39. Rectal mucosal biopsy is the investigation of choice. ( )
40. Colostomy is the first step in the treatment of this case ( )
41. Surgical treatment is the only curative line of treatment. ( )
42. Anal dilatation and laxative can be a line of treatment ( )

# Cancer Colon



## Colon Cancer

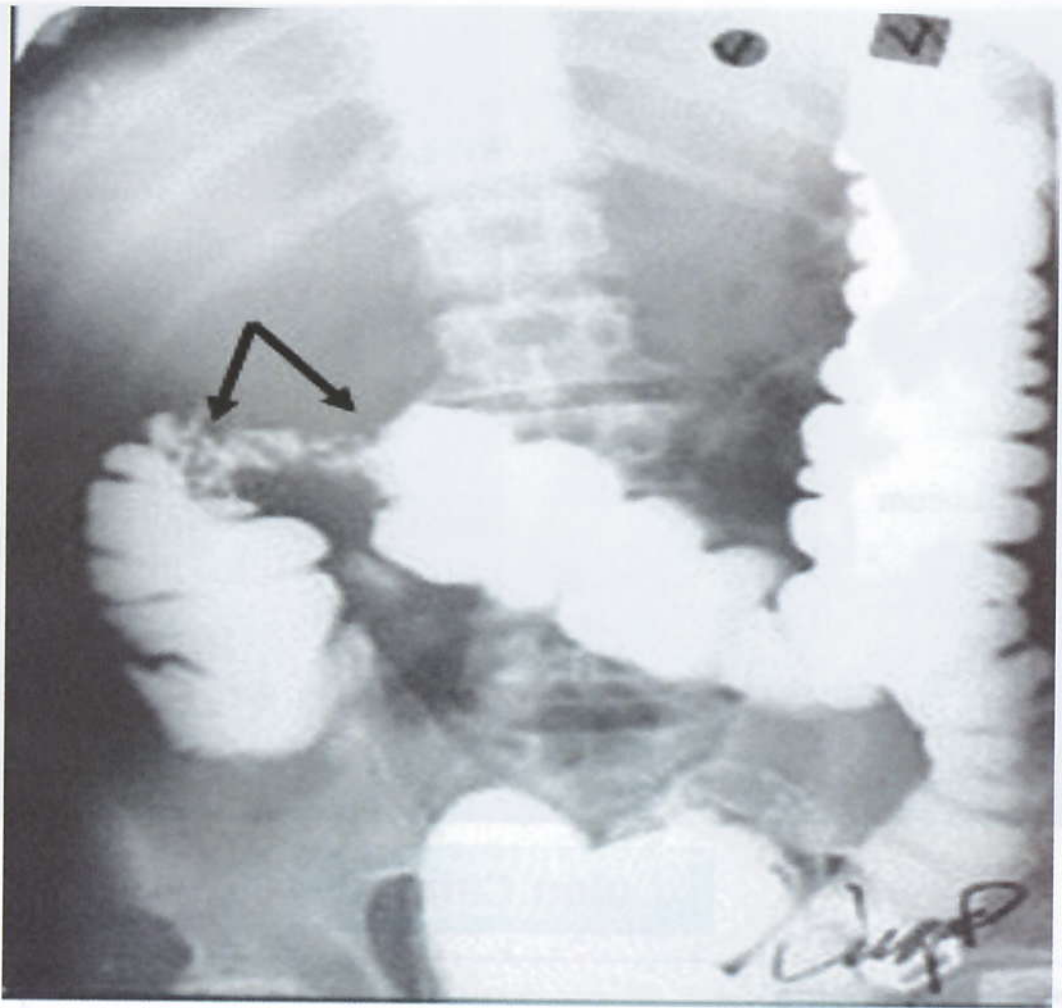
- Barium enema
- showing the characteristic persistent irregular filling defect of Right Colon Cancer

### Questions( True or false )

43. This study is a barium meal follow through ( )
44. There is an irregular filling defect in the right colon ( )
45. This study shows apple core appearance of the right co ( )
46. This picture is suggestive of malignancy ( )
47. This patient presents with anorexia, weakness, weight loss and long standing dyspepsia ( )
48. This patient presents with chronic progressive constipation alternating with attacks of diarrhea ( )
49. Stool analysis and cytology can help to confirm the diagnosis ( )
50. Colonoscopy and biopsy is the best investigation ( )
51. Surgery is the main line of Ttt (radical resection) ( )
52. Colostomy may be needed in obstructive cases ( )



## Cancer Colon



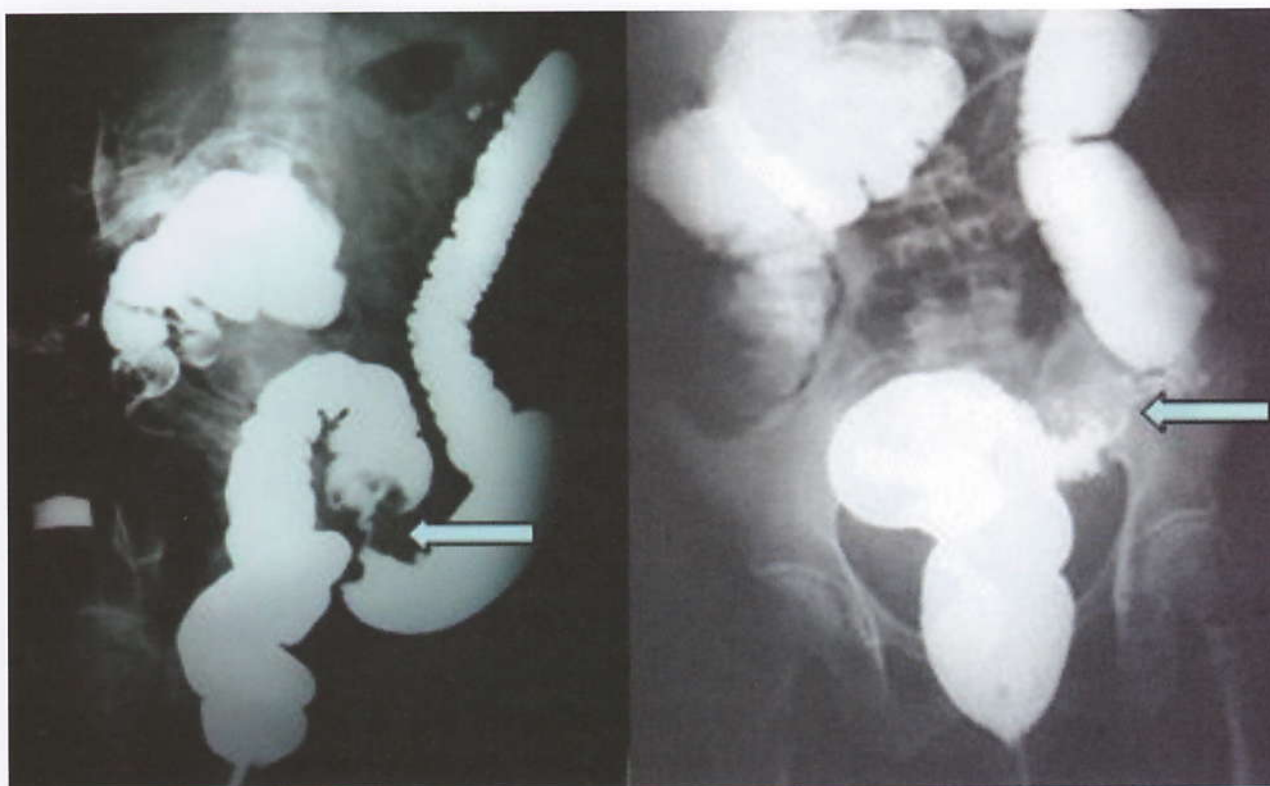
### Hepatic Flexure Cancer

- Barium enema
- showing the characteristic irregular narrowing that is suggestive of Hepatic Flexure Cancer

### Questions(True or false)

53. There is a stricture seen at the hepatic flexure of the colon ( )
54. Ulcerative colitis can be a possible predisposing factor ( )
55. Dyspepsia is the main clinical presentation ( )
56. Stool analysis is the best investigation ( )
57. Colostomy is the best line of treatment ( )
58. Extended right hemicolectomy is the best surgical treatment ( )
59. Chemotherapy is the best line of treatment for advanced Obstructed cases ( )

## Cancer Colon



### Sigmoid and rectosigmoid junction cancers

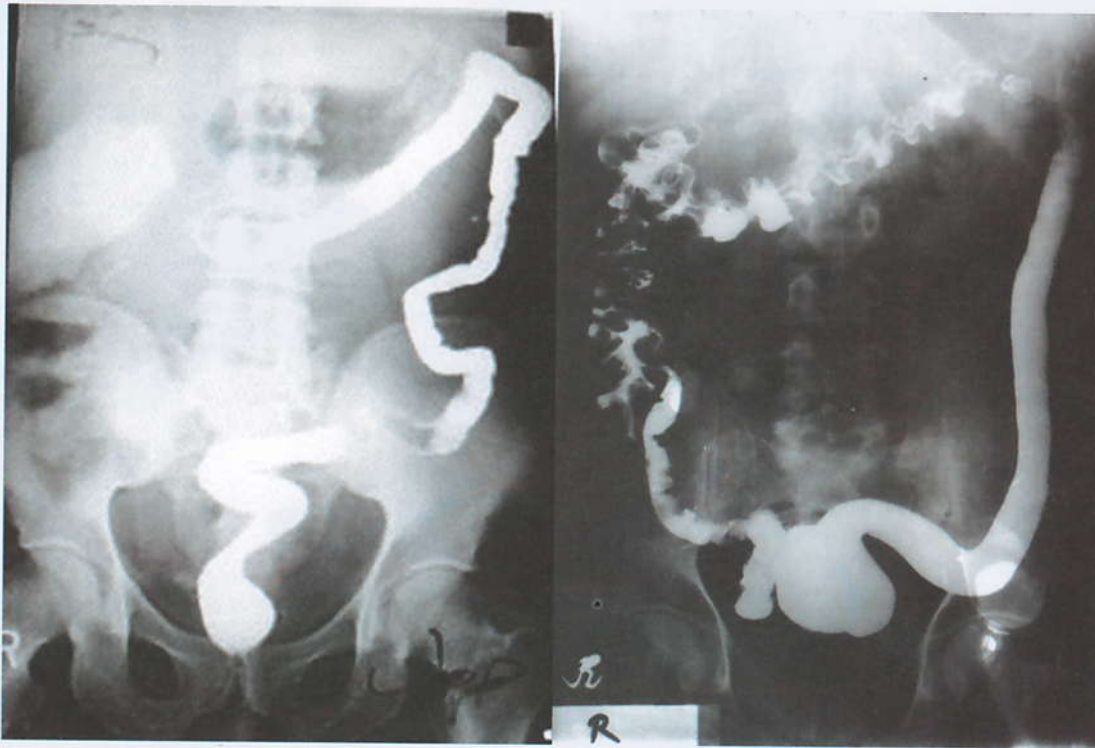
- Barium enema
- Showing examples of sigmoid and rectosigmoid junction cancers.
- This is the commonest site of colorectal malignancy.
- This is also the site of cancer that is more likely to cause obstruction than that of the right colon

### Questions (True or false)

60. This study is a barium enema double contrast ( )
61. There is an irregular filling defect at the sigmoid region ( )
62. Bilharziasis could be a predisposing factor ( )
63. The main clinical presentation is a mass in left lower abdomen ( )
64. Fresh bleeding per rectum is a possible clinical presentation ( )
65. This condition usually complicates with intestinal obstruction ( )
66. Chronic progressive constipation is the main clinical presentation ( )
67. Hartman's procedure can be done for obstructed cases ( )
68. Hartman's procedure is the first step in treatment of early cases ( )
69. Long standing dyspepsia, weakness and weight loss are the main presentations ( )



# Inflammatory Bowel Disease



## Ulcerative colitis

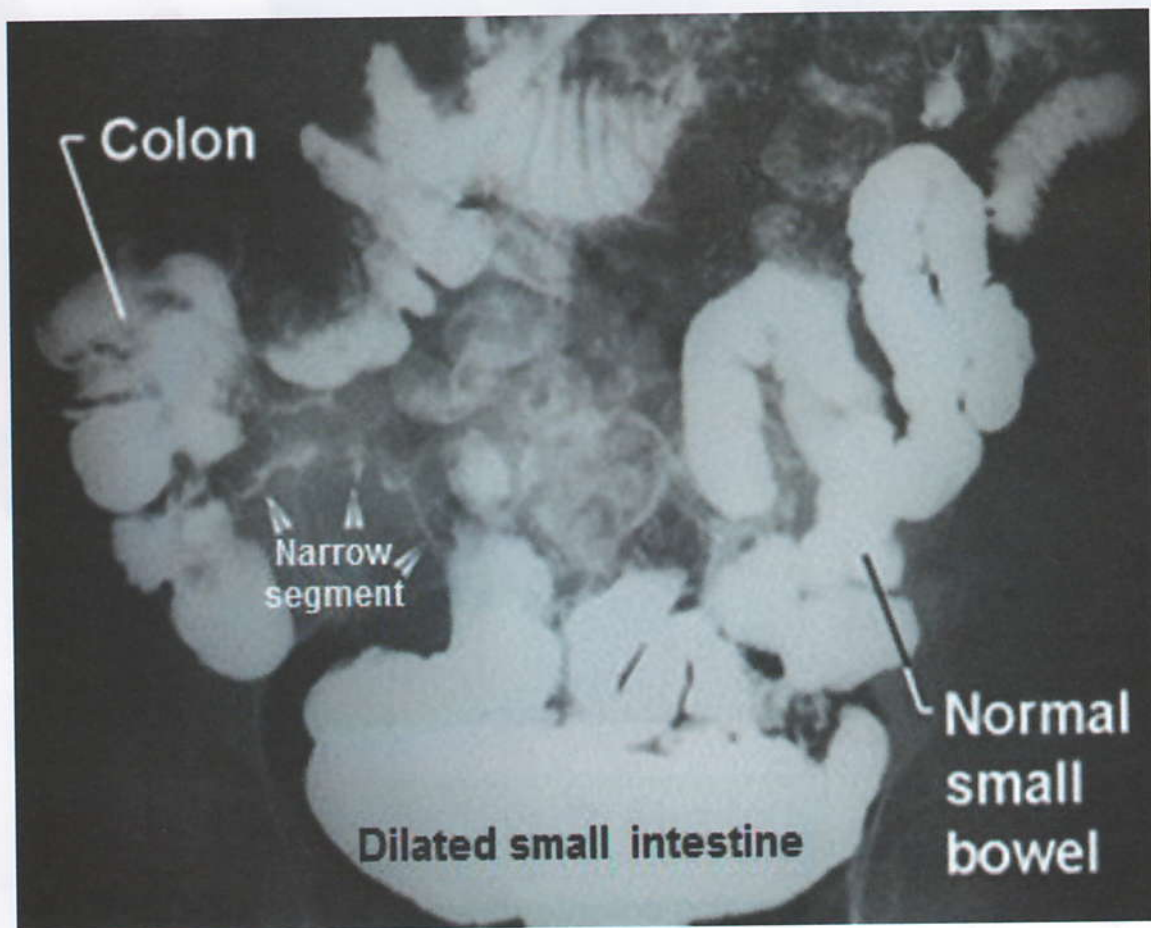
- Barium enema
- Showing loss of haustration, short & narrow colon causing pipe steam appearance.
- Filling defects caused by wide spread ulcers & filling excesses caused by mucosal regeneration give ground glass appearance.
- Affection of the rectum with or without variable segments of colon with no skip lesions is characteristic for ulcerative colitis.

## Questions (True or false)

70. There is an irregular filling defect in the right colon ( )
71. This condition can turn malignant ( )
72. The possible underlying cause is aganglionosis ( )
73. Tender palpable colon and weight loss are common feature ( )
74. Diarrhea, blood and mucus per rectum are common presentations ( )
75. Stool analysis can confirm the diagnosis. ( )
76. Colonoscopy can confirm the diagnosis ( )
77. Medical treatment is the principle line ( )
78. Surgery is reserved for complicated cases ( )
79. Hartman's procedure is the main surgical treatment ( )



# Inflammatory Bowel Disease



## Crohn's disease

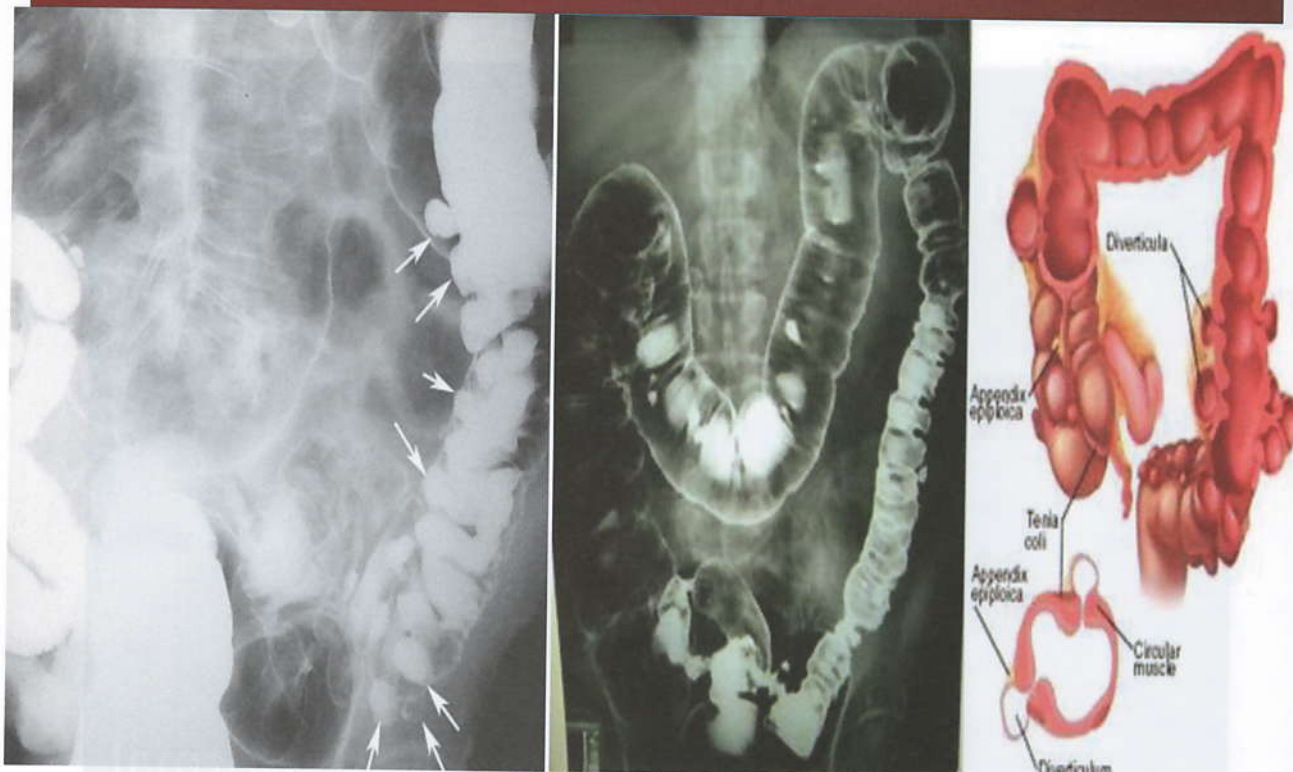
- Barium meals follow through showing narrowing of terminal ileum and proximal dilatation.
- This is a case of ileocecal Crohn's disease

### Questions (True or false)

80. This is Barium enema ( )
81. Apple core appearance is the characteristic radiological sign ( )
82. Autoimmune disorder can be an underlying cause ( )
83. Malabsorption and weight loss are the main presentation ( )
84. Massive bleeding per rectum is possible complication ( )
85. Intestinal obstruction is a possible complication ( )
86. Fistula formation is a common complication ( )
87. Medical conservative treatment is the first step in management ( )
88. Rt. hemi-colectomy is the treatment of choice ( )
89. Total colectomy is indicated as the condition is precancerous ( )



# Colonic Diverticula



## Colonic diverticula

- Barium enemas showing colonic diverticula.
- Remember that Barium enema is contraindicated in acute diverticulitis or acute exacerbation of ulcerative colitis

## Questions (True or false)

90. The main etiology of this condition is chronic constipation. ( )
91. The possible underlying cause is Diverticulosis coli ( )
92. The possible underlying cause is Bilharziasis ( )
93. This condition could turn malignant ( )
94. Barium enema is contraindicated in acute diverticulitis. ( )
95. Profuse bleeding caused by diverticulosis usually stops spontaneously. ( )
96. Acute abdomen is a possible complication ( )
97. This patient may present with a mass in his left lower abdomen ( )
98. Bleeding per rectum is a possible complication ( )
99. Colonoscopy is the investigation of choice ( )
100. Surgery is reserved for complicated cases only ( )
101. The main treatment is correct constipation ( )

# Colonic Polyps



## Colonic Polyps

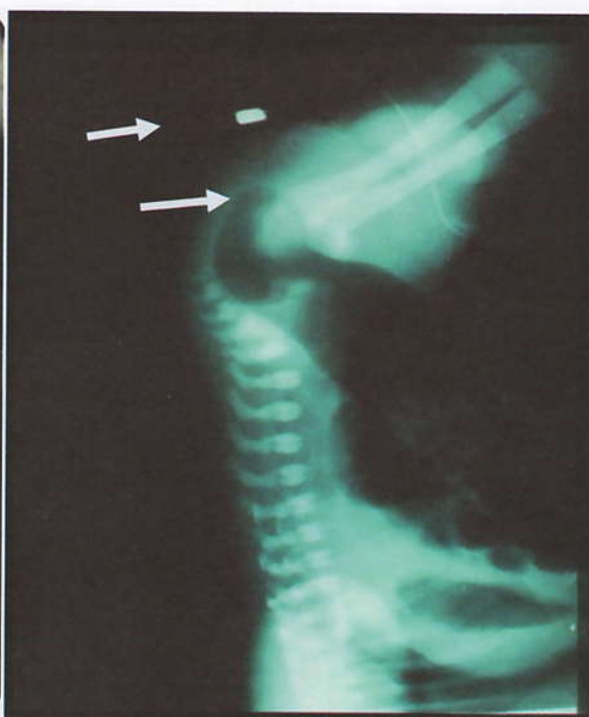
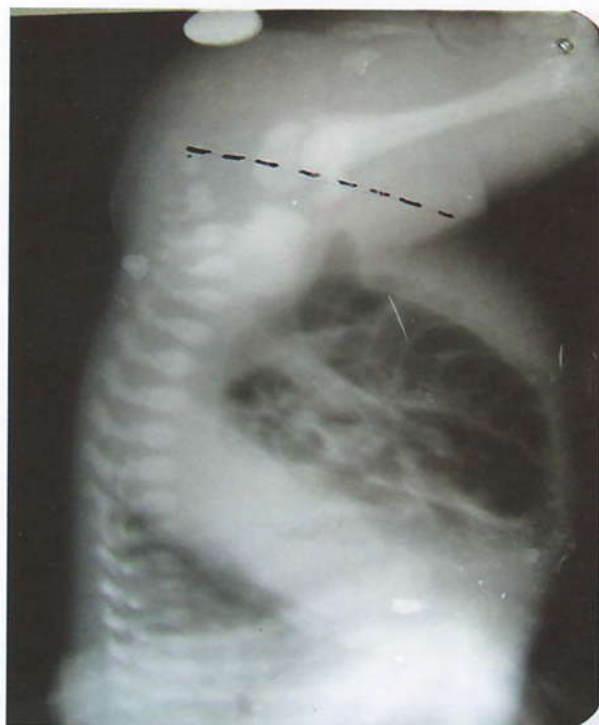
- Barium enema showing multiple filling defects of colonic polyps

### Questions (True or false)

102. The contrast used is barium enema ( )
103. The lesion is adenomas ( )
104. This patient may complain of with diarrhea ( )
105. This patient may present with acute abdominal pain ( )
106. it can turn malignant ( )
107. Chronic constipation is the main clinical presentation ( )
108. The lesion involves the whole colon ( )
109. Stool analysis can help in the diagnosis ( )
110. Colonoscopy and biopsy is the investigation of choice ( )
111. Surgery is the only line of treatment ( )



## Anorectal Anomalies



### High anorectal anomaly

- Neonate with imperforate anus.
- Plain X-ray in inverted position
- The distal part of the gut, as shown by its gas content, lies above the pelvic floor, which is shown here as a dotted line extending from the tip of coccyx to the symphysis pubis
- This is a high anorectal anomaly

### Questions (True or false)

112. This investigation is called invertogram. ( )
113. This investigation should be done 24 hrs after birth with baby inverted upside down & flexed thighs with lateral imaging. ( )
114. The intestine is seen full of air ( )
115. It may be associated with other congenital anomalies. ( )
116. Abdominal distention is present in such condition. ( )
117. The patient may present with repeated vomiting ( )
118. Neonatal intestinal obstruction is a common feature ( )
119. This patient may pass meconium per vagina or urethra ( )
120. Patient present with absence of meconium per anus after birth ( )
121. Colostomy is the only line of treatment. ( )
122. Continence for stool is excellent after surgery for high anomaly ( )



# Intestine Key answer

|    |       |
|----|-------|
| 1  | TRUE  |
| 2  | FALSE |
| 3  | True  |
| 4  | True  |
| 5  | True  |
| 6  | FALSE |
| 7  | FALSE |
| 8  | True  |
| 9  | FALSE |
| 10 | True  |
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| 28 | True  |
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| 30 | FALSE |
| 31 | FALSE |

|    |       |
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| 62 | FALSE |

|    |       |
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| 106 | True  |
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| 109 | FALSE |
| 110 | True  |
| 111 | True  |
| 112 | True  |
| 113 | True  |
| 114 | True  |
| 115 | True  |
| 116 | True  |
| 117 | True  |
| 118 | True  |
| 119 | True  |
| 120 | True  |
| 121 | FALSE |
| 122 | FALSE |



## Important points& tweets based on our questions

- N.B:** Ba enema can reach the caecum, so cancer caecum 5% multicentric can reach caecum, can be detected by the Ba enema.
- N.B:** In case of Obstruction, Xray done( erect to detect the air fluid level. Diagnose the obstruction) ( supine → detect the level).
- Q3:** Etiology of intestinal obstruction is according to nature ( simple mechanical, paralytic ileus & strangulation), or level ( high small, low small& large bowel obstruction) according to onset (Acute or Chronic)
- Q4:** adhesions is the commonest cause of small intestinal obs. in adults  
strangulation is commonest in children, cancer colon is the commonest cause for large bowel obstruction.
- Q5:** pain is commonest symptom, distension, absolute constipation, vomiting early with high obstruction.
- Q6:** Paralytic ileus no pain & no bowel sounds.
- Q8:** in neglected cases, vomiting becomes greenish then brown & offensive, faeculent ( not faecal).
- Q11:** TTT is urgent relieve of obstruction by surgery (exploration, determine the level & relieve the obstruction according to the cause) after adequate preoperative preparation (Drip & Suck)( IV fluids, nasogastric tube& Antibiotics).
- Q13:** Huge gas filled sigmoid loop look like inner tube of a tyre( omega loop) by plain Xray.
- Q14:** elderly chronically constipated males.
- Q15:** TTT in early cases sigmoidoscope & rectal tube.. to pass a gush of gas & fluid stool, if failed → surgical resection of gangrenous part.
- Q16:** Intussusception is common in well nourished infants(6-12 month)  
male>female(2:1)
- Q17:** Attacks of abdominal pain, VOMITING FOLLOWS IN 85% alternates with intervals of apparent well-being, during which the infants asks for feeding.
- Q18:**
  - Emptiness in rt iliac fossa(sign de Dance)..
  - Sausage shaped mass may be felt.
- Q22:** In minority of cases there is evident cause at head of intussusception.



- Q27:** Resuscitation by fluids, antibiotics & ryle.. then a trial for hydrostatic reduction is performed (success rate is 75-95%).. if failed laparotomy is done.
- Q30:** Ba shows narrowed aganglionic segment , followed by dilated normal ganglionic segment , accurate in 80%.
- Q31:** Abscent submucosal & intermuscular plexuses
- Q32:** Hirschsprung's suspected in a newborn with delayed passage of meconium for more than 24 hrs after birth, Common in males (4:1)
- Q35:** Severe complications like obstructive enterocolitis may occur , during the attack pt develops pyrexia , distension & diarrhea .
- Q38:** Anorectal Manometry reveals failure of relaxation of anal sphincters in response to rectal distension .
- Q39:** Ba enema accurate in 80% of cases, small segment rectal biopsy from mucosa & sub mucosa is diagnostic.
- Q40:** 1stly ryle suction, IV fluids & repeated wash out with saline .. ,,, if obstruction was not relieved do urgent colostomy  
but if obstruction is relieved .. prepare for elective surgery( at 6-9 months by resection & anastomosis) .
- Q45:** Ba enema , fixed irregular filling defect , apple core appearance , even if there is a palpable rectal cancer, Ba enema is useful to exclude a 2<sup>nd</sup> higher tumor.
- Q47:** Right colon cancer cause (anemia, asthenia , anorexia), vague symptoms.. pt may present with recurrent attacks of pain in rt iliac fossa , wide lumen so no constipation or obstruction.
- Q50:** BIOPSY is mandatory in any male pt above 40 years with complain of piles or intestinal obstruction.
- Q54:** Ulcerative colitis especially pancolitis for > 10 years have higher risk for cancer colon (multicentric) .
- Q59:** palliative resection of the colon cancer is preferred .
- Q62:** predisposing factors ; solitary villous adenoma, FPC(100% risk ) ulcerative colitis(pancolitis for 10 years) , ureterocolic anastomosis.



- Q65:** Commonest presentation in left side colon cancer is constipation, or diarrhea alternating with constipation, bleeding per rectum is very common .. but not massive.. mass is rare.. if felt usually due to afecal mass above the tumor.
- Q70:** Ulcerative colitis starts at dentate line of Anal canal , extend proximally, either proctitis only or pancolitis.
- Q71:** complicated by \*toxic megacolon in 3-5% \* he \* cancer especially pancolitis after 10 years.
- Q73:** more in females , 3<sup>rd</sup> or 4<sup>th</sup> decade , watery diarrhea mixed with blood , mucous or pus with tensmus , pain , fever, wt loss ... Remission& Relapses.
- Q76:** Lab. Findings can detect anemia, leucocytosis / Ba enema useful / colonoscopy& biopsy shows the mucosal abnormalities ..and extend of the disease , but endoscopy is contraindicated with toxic megacolon.
- Q78:** Medical TTT for majority of cases , surgery done if ( failed medical , stricture formation, toxic mega colon or pancolitis for long cases).
- Q81:** Ba meal & follow through shows segmental areas of stricture separated by skip lesions of free bowel & COBBLE STONE appearance of mucosa & can shows narrowed terminal ileal segment known as string sign of Kantor .
- Q83:** Peak age at 2<sup>nd</sup>-4<sup>th</sup> decade , equal in both males& females, diarrhea, wt loss abd. Pain & weakness.
- Q86:** complicated by:
- Stricture& intestinal obstruction
  - Malabsorbtion
  - Abcess & fistula formation
  - Extraintestinal complications .
- Q88:** Medical TTT (low residue high protein diet, antispasmodics, Aminosalysilates , steroids & infliximab ) surgery indicated if complicated cases ( resection of affected segments.. avoid long segment resection to avoid malabsorbtion).
- Q90:** Aetiology of diverticular disease is due to lack of fiber in diet → chronic constipation,pulsion diverticula of colonic mucosa through circular muscle layer at points of entery of blood vessels, commonest site is Sigmoid colon ,but rectum never affected .
- Q93:** Complications :
- Acute diverticulitis
  - Perforation & localized peritonitis
  - Bleeding
  - Fistula
  - Colon stricture .

- Q94:** Ba enema shows saw toothed appearance, but contraindicated during acute diverticulitis. sigmoidoscopy shows the mouths of diverticula  
CT scan best in acute diverticulitis.
- Q95:** ONE of 2 commonest causes of massive bleeding per rectum( with angiodysplasia)... colonoscopy is difficult during bleeding so Angiography is the best to detect the bleeder.
- Q97:** Tender mass in left iliac fossa , the mass has to be differentiated from cancer( the later has a short duration & pain absent in 25% ).
- Q100:** high fiber diet prescribed, antispasmodics / acute diverticulitis ttt as appendicular mass, /if pericolic abscess → open drainage& sonar guided aspiration done,/ if bleeding→ resuscitation& usually stops spontaneously .
- Q112:** Plain Xray in inverted position(Invertogram) , 24 hrs after delivery enough amount of gases are travelled along the colon reach distal end of bowel, - , the baby put in inverted position and a coin is put at the possible site of anus .. the distal gas shadow is measured, if > 1cm→ denotes high anomaly , if <1cm →low anomaly .
- Q115:** VACTERL , congenital defects associated with high anomaly more than low anomalies , & alter the prognosis of the condition.
- Q117:** evidence of intestinal obstruction( vomiting & distension).
- Q119:** may pass meconium from penis or vagina in case of associated fistula.
- Q122:** High anomalies→ staged surgery (1stly colostomy then abdomino-ano-rectal pull-through,-, then closure of colostomy) results usually not good.  
low anomalies → local perineal surgery with excellent results.



**Q12** As anema shows saw toothed appearance, but contraindicated during acute diverticulitis sigmoidoscopy shows the mouth of diverticula  
CT scan best in acute diverticulitis.

**Q13** ONE of 2 commonest causes of massive bleeding per rectum (with angiodysplasia)... colonoscopy is difficult during bleeding so Angiography is the best to detect the bleeder.

**Q14** Tender mass in left iliac fossa, the mass has to be differentiated from cancer (the later has a short duration & pain absent in 25%).

**Q15** high fiber diet prescribed, antispasmodics / acute diverticulitis fit as appendicular mass, fit pericolic spaces → open drainage & sonar guided aspiration done, if bleeding → resuscitation & usually stops spontaneously.

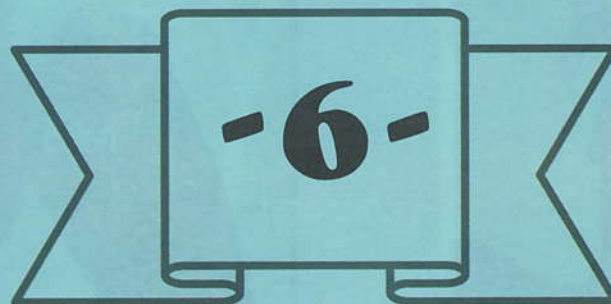
**Q16** Plain Xray in inverted position (invertedgram), 24 hrs after delivery enough amount of gases are travelled along the colon reach distal end of bowel, the baby put in inverted position and a coin is put at the possible site of anus.. the distal gas shadow is measured, if > 1cm → denotes high anomaly, if < 1cm → low anomaly.

**Q17** VACTERL, congenital defects associated with high anomaly more than low anomalies, & alter the prognosis of the condition.

**Q18** evidence of intestinal obstruction (vomiting & distension).

**Q19** may pass meconium from penis or vagina in case of associated fistula.

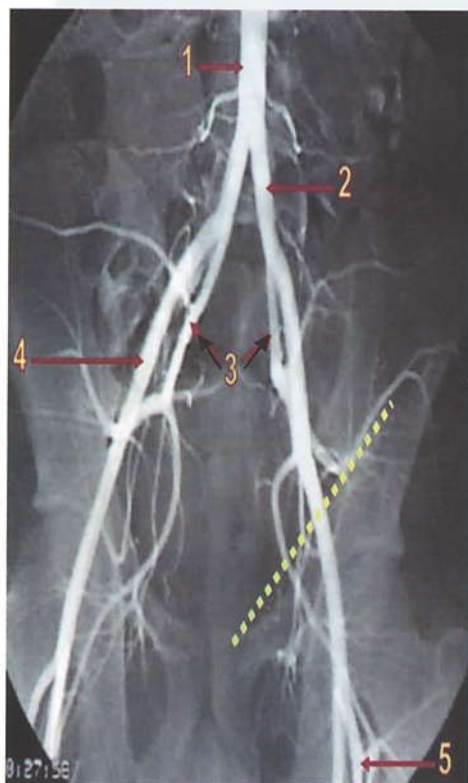
**Q20** High anomalies → staged surgery (fatty colostomy then abdomino-anal pull-through, then closure of colostomy) results usually not good.  
low anomalies → local perineal surgery with excellent results.



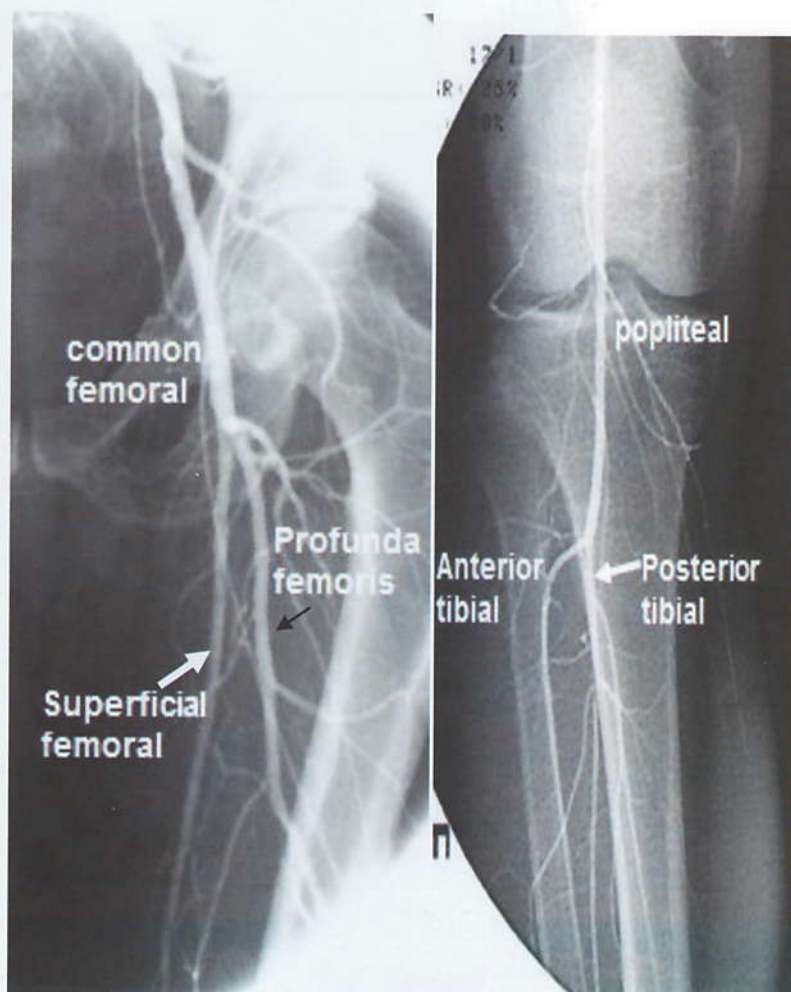
# **Vascular Radiology**



# Normal Angiography



1. Lower abdominal aorta
2. Common iliac A.
3. Internal iliac A.
4. External iliac A.
5. Deep femoral A.



- Aortography for chronic lower limb ischemia is done if the ischemia is severe enough to require arterial reconstruction.
- Arteriography shows the feasibility of this surgery. It shows:
  - The narrowing or block and its extent
  - Proximal arterial tree patency
  - Distal arterial tree patency (distal run-off)
- Arteriography not done for mild ischemia that treated conservatively
- For aortography contrast material is injected through one of these routes:
  - Retrograde percutaneous transfemoral using Seldinger's technique
  - Through brachial artery
  - Translumbar (directly injecting the aorta). This is rarely used nowadays
  - For digital subtraction arteriography (DSA) the contrast material is injected into a peripheral artery, or even a vein.
- The commonly used contrast material for arteriography contains iodine and may induce an allergic reaction. The following precautions are taken:
  - Ask patient about iodine allergy
  - Be ready with corticosteroids, adrenaline and anti-histamine medications
- Arteriography is an invasive procedure. It is a common cause of iatrogenic arterial injuries



# Aorto-iliac Atherosclerosis



- Translumbar aortography
- Complete occlusion of left iliac A.
- Occluded right external iliac A.
- Do not judge the feasibility of arterial surgery or its type except after checking the rest of LL arteries

- Short stenotic segments at origins of iliac arteries
- It can be treated by either percutaneous transluminal angioplasty (PTA) + stent or with endarterectomy



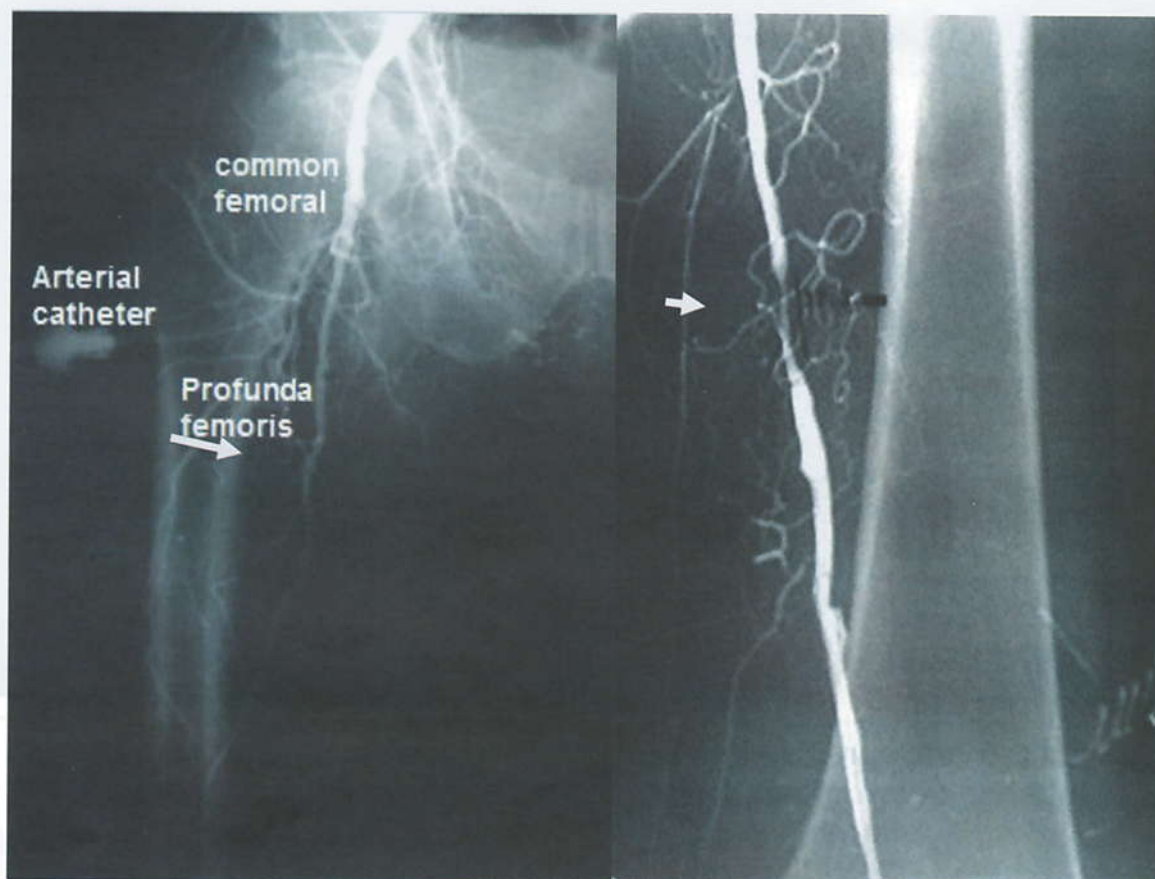
- Digital subtraction arteriography (DSA). Notice that using digital technology allows removal of bone shadow from the film, and thus allows better focusing on the arteriogram
- Blocked right external iliac artery (arrow)
- Do not judge the feasibility of arterial surgery or its type except after checking the rest of LL arteries

## Questions (True or false)

1. A needle is seen related to the aorta ( )
2. This is an invasive study ( )
3. Severe ischemia is the main indication for this study ( )
4. Le Rich syndrome is a possible complication ( )
5. The first line of treatment is by lumbar sympathectomy ( )



# Superficial femoral atherosclerosis



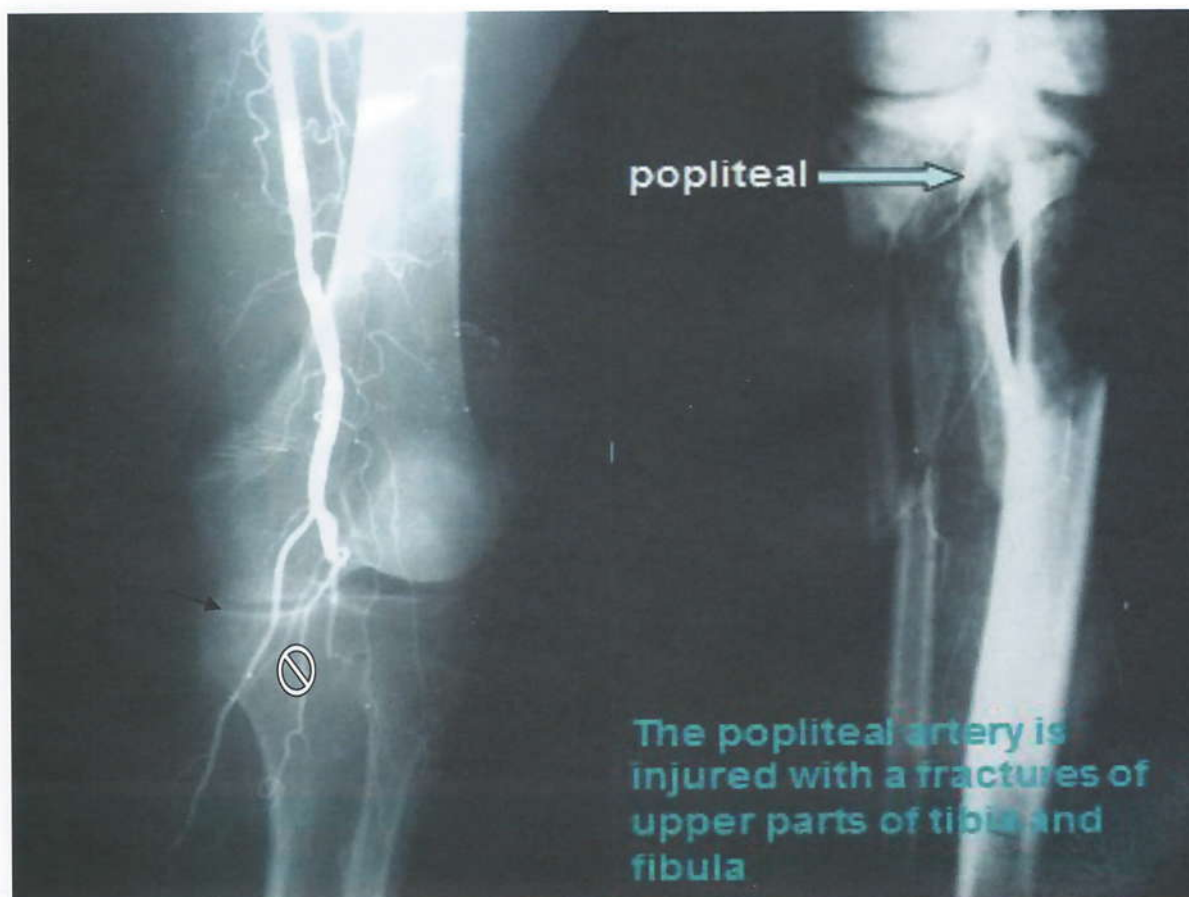
- Transfemoral arteriography
- Right superficial femoral artery block

- Left superficial femoral artery stenosis

## Questions (True or false)

- |                                                          |     |
|----------------------------------------------------------|-----|
| 6. This is a direct trans- femoral angiography           | ( ) |
| 7. The catheter is inserted in the common femoral artery | ( ) |
| 8. The Profunda femoris is healthy                       | ( ) |
| 9. Severe ischemia is the main indication for this study | ( ) |
| 10. Buerger's disease is the underlying cause            | ( ) |

# Popliteal atherosclerosis



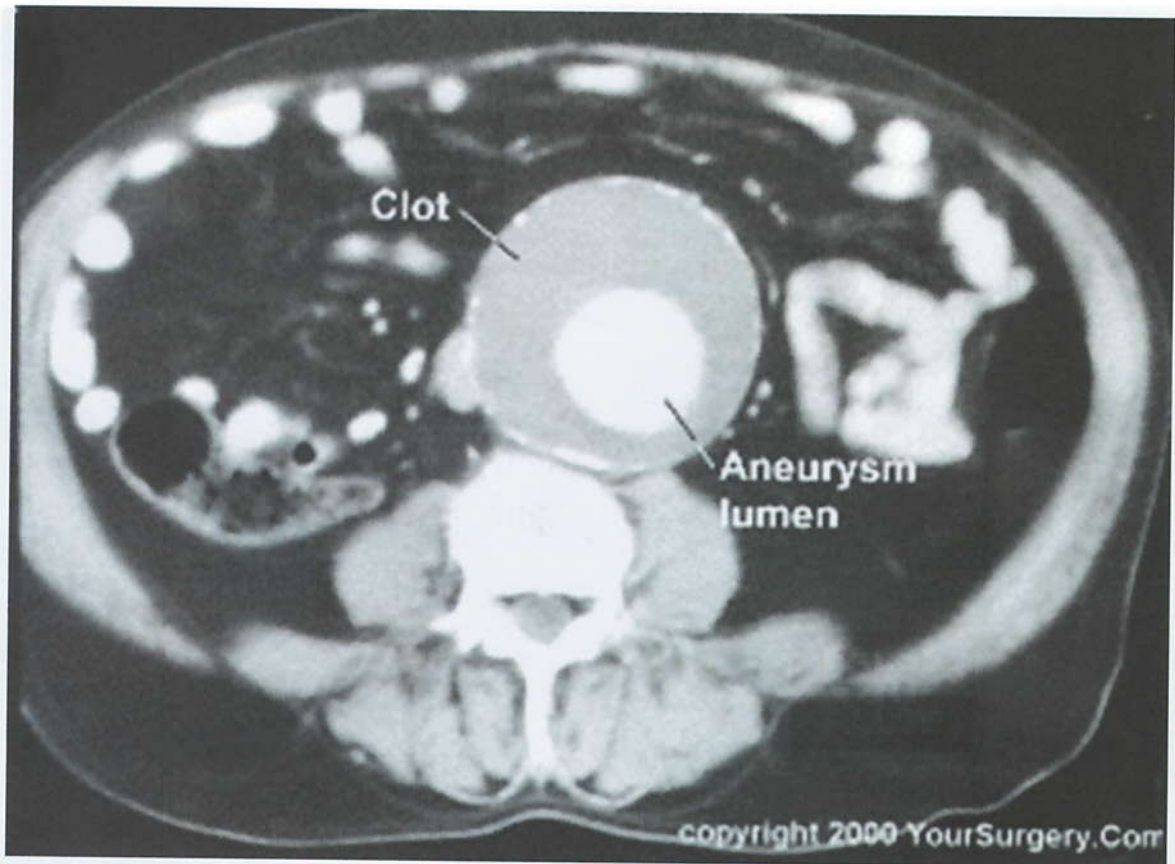
- Examples of popliteal artery blocks
- Do not judge the feasibility of arterial surgery or its type except after checking the rest of lower limb arteries

## Questions (True or false)

11. There is occlusion of the Profunda femoris seen in this study ( )
12. The underlying pathology is Raynaud's disease ( )
13. This patient may present with cramps in the thigh muscles ( )
14. This patient may present with ischemic heart disease ( )
15. Sympathectomy is indicated if there is a good distal run off ( )



# Aneurysms

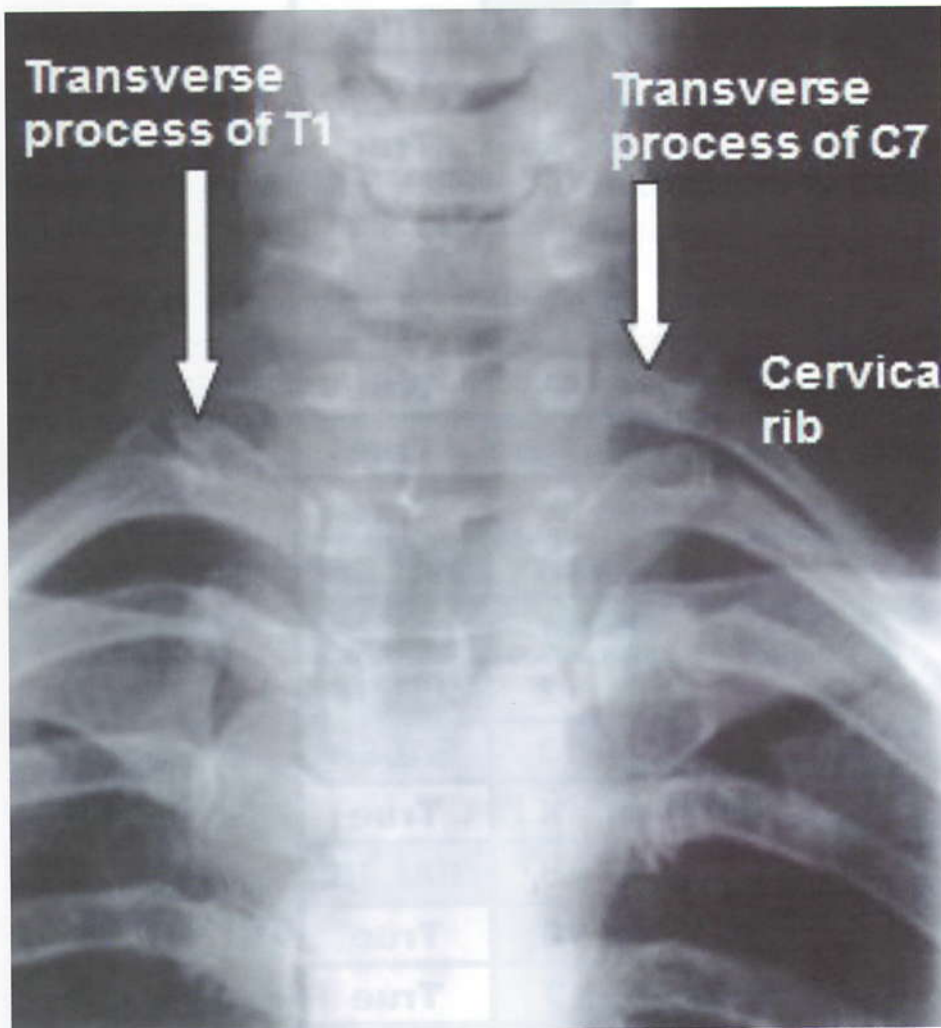


- CT scans with IV contrast
- Scans on the right side show abdominal aortic aneurysms.

## Questions (True or false)

16. Atherosclerosis is the underlying cause ( )
17. This patient has a poor renal function ( )
18. This patient may suffer from bilateral lower limb ischemia ( )
19. Pseudo pancreatic cyst is a common differential diagnosis ( )
20. Aorto -femoral by pass is the best surgical treatment ( )

# Thoracic Outlet Syndrome



- Plain X-ray
- Left cervical rib.
- Notice that the transverse process of a thoracic vertebra is directed up, while that of a cervical vertebra is directed down.
- This is the basis of diagnosing a cervical rib.

## Questions (True or false)

- |                                                                 |     |
|-----------------------------------------------------------------|-----|
| 21. There is a cervical rib seen in this x-ray                  | ( ) |
| 22. There is sensory & motor changes in the upper limb          | ( ) |
| 23. Cervical spondylosis can be a clinical DD of this condition | ( ) |
| 24. Nerve conduction study is a useful investigation            | ( ) |
| 25. Surgery is the treatment of choice                          | ( ) |



# Vascular Key answer

|    |       |
|----|-------|
| 1  | True  |
| 2  | True  |
| 3  | True  |
| 4  | FALSE |
| 5  | FALSE |
| 6  | True  |
| 7  | True  |
| 8  | True  |
| 9  | True  |
| 10 | FALSE |
| 11 | FALSE |
| 12 | FALSE |
| 13 | FALSE |
| 14 | True  |
| 15 | FALSE |
| 16 | True  |
| 17 | True  |
| 18 | True  |
| 19 | True  |
| 20 | FALSE |
| 21 | True  |
| 22 | True  |
| 23 | True  |
| 24 | True  |
| 25 | True  |

## Important points & tweets based on our questions

**Q1:**

- The screening and follow up investigation in chronic ischemia is doppler or duplex.
- Arteriography is done in chronic limb ischemia if there is need for revascularization.

**Q2:**

- In arteriography the dye is given intra arterial ,in digital subtraction angiography & CT angiography the dye is given I.V. , in MRA no dye is given

**Q4:**

- In chronic limb ischemia, if aortoiliac block, diminished blood flow to internal iliac arteries, can cause bilateral LL. Claudication, absent femoral pulse , & impotence >> Leriche syndrome.

**Q5:**

- In mild to moderate limb ischemia conservative TTT is the first line.
- In severe claudications or critical ischemia revascularization surgery is needed.
- For aortoiliac disease aorto bifemoral bpass is done using synthetic graft.
- For superficial femoral block the standard TTT if femoro popliteal bypass. The saphenous vein is the best graft for this operation.
- Patients with no distal run off can be treated by lumbar sympathectomy , intravenous prostaglandin E ,or amputation if gangrene occurs.

**Q10:**

- Buerger's disease affects small arteries of the L.L, and it has patchy distribution.
- Interdigital fungal infection is a common association with Buerger's disease & smoking is a risk factor , Severe pain is a hallmark of disease.

**Q11:**

- Blocked posterior tibial A. in the 1st image.

**Q12:**

- Raynaud's phenomenon occurs in upper limbs .

**Q13:**

- Intermittent claudications ↑ by exercise ↓ by rest affect calf muscles in case of femoral & popliteal occlusion.

**Q14:**

- If due to atherosclerosis, there may be associated symptoms in heart , intestine or cerebral but in the 2nd image it is traumatic.

**Q16:**

- Atherosclerosis is the commonest cause of aneurysms.
- A blunt arterial trauma leads to true aneurysm.
- A penetrating arterial trauma leads to false aneurysm.

**Q17:**

- In abdominal aortic aneurysm : in 95% of cases it is due to atherosclerosis and lies below the renal vessels. In 75% it is asymptomatic.
- Pain is the commonest symptom of AAA.
- The screening test of AAA is ultrasound.
- Arteriography is rarely needed in AAA.

**Q20:**

- The 5 year rupture rate of AAA of diameter 5 cm is very high , so elective surgery is needed.
- Patients with non complicated AAA with diameter below 5 cm should be only followed up by US every 6 months.



- Open surgery and exclusion graft is the standard method of surgery, while endovascular repair is reserved to patients with high general or local risks.

**Q23:**

- D.D from other causes of localized pressure on the nerve as \_cervical spondylosis & carpal tunnel syndrome

**Q25:**

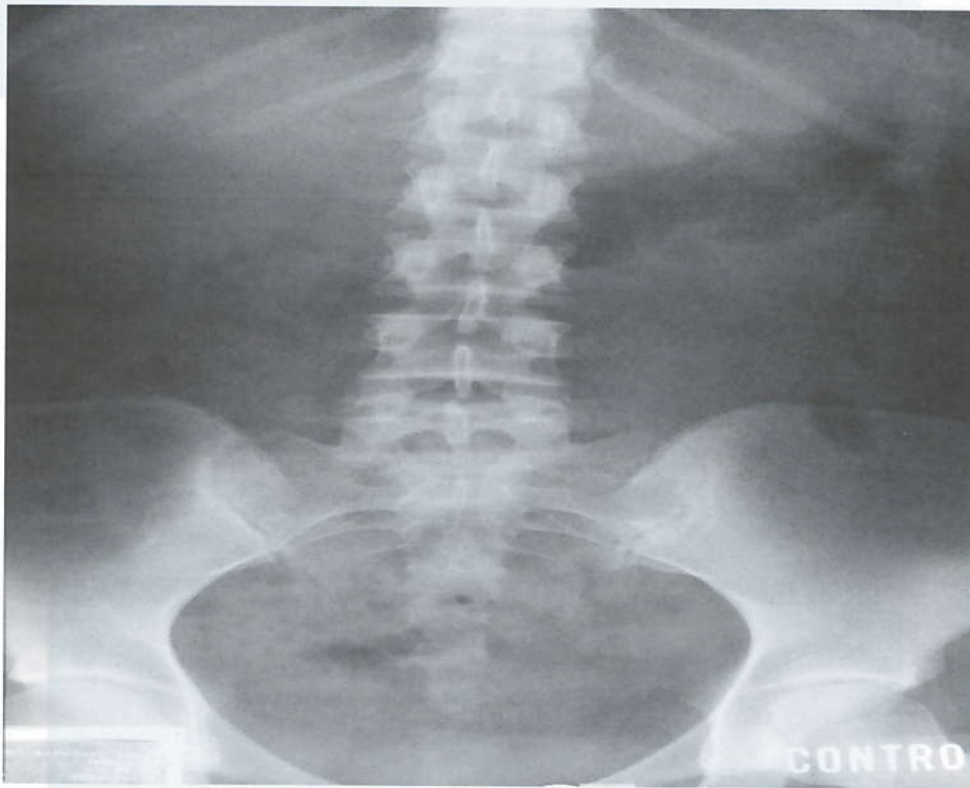
- Early cases physiotherapy to strengthen the shoulder muscles , relieve the symptoms  
failure of conservative ttt, indicates surgeical method to relive the compression.

-7-

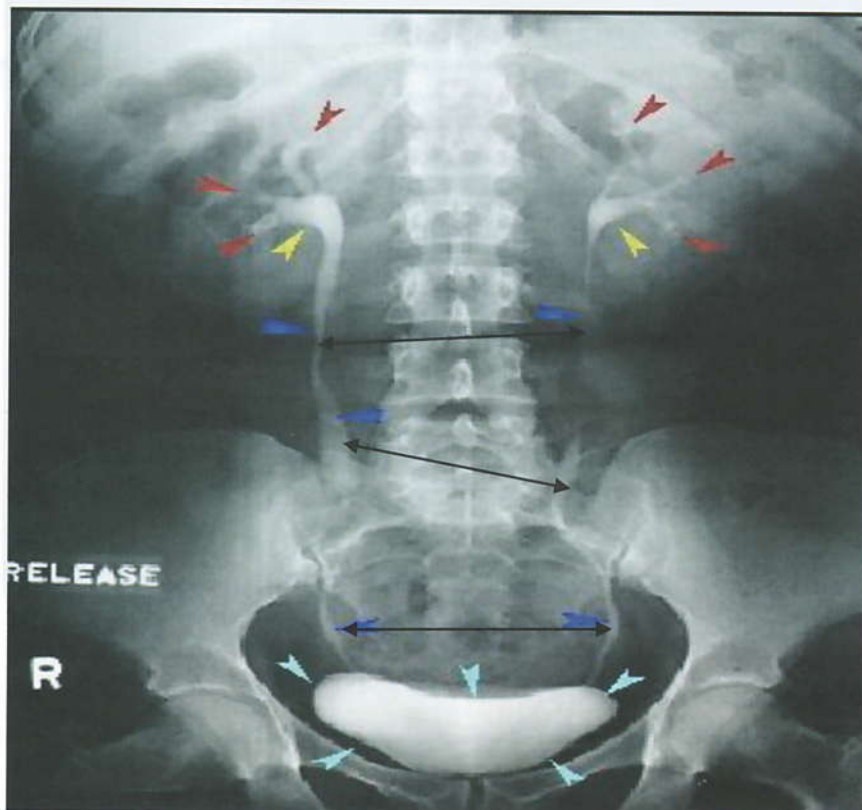
# **Urosurgery Radiology**



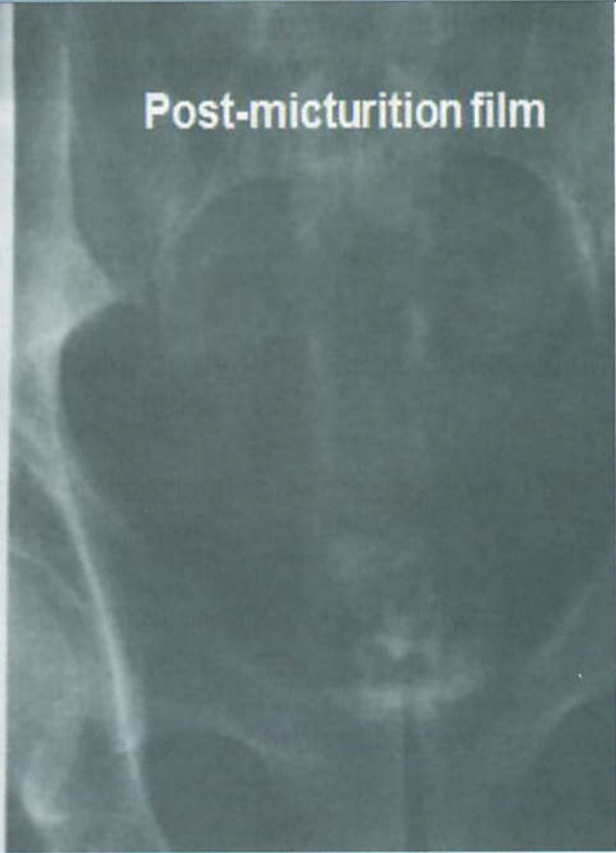
## Normal Appearance



**Normal Plain Urinary Tract PUT**

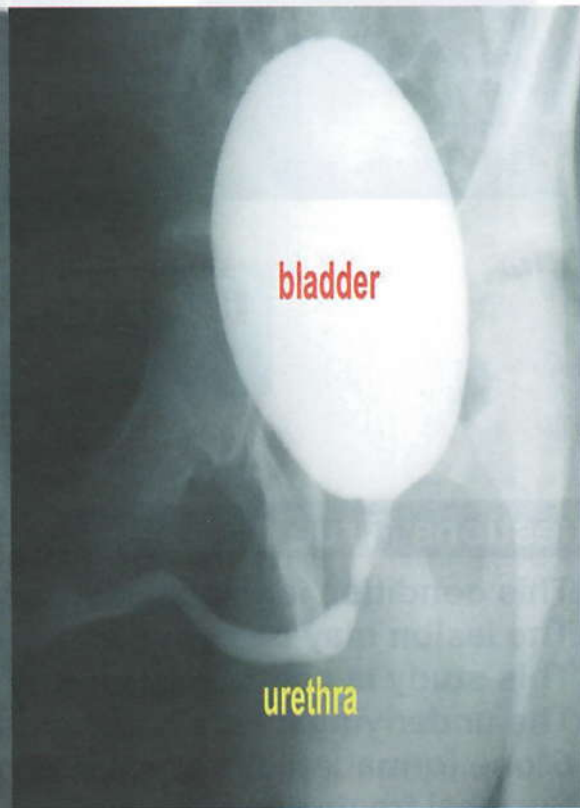


**Normal Intra-Venous Urography**



Post-micturition film

**Normal cystography and post-micturition film**



bladder

urethra

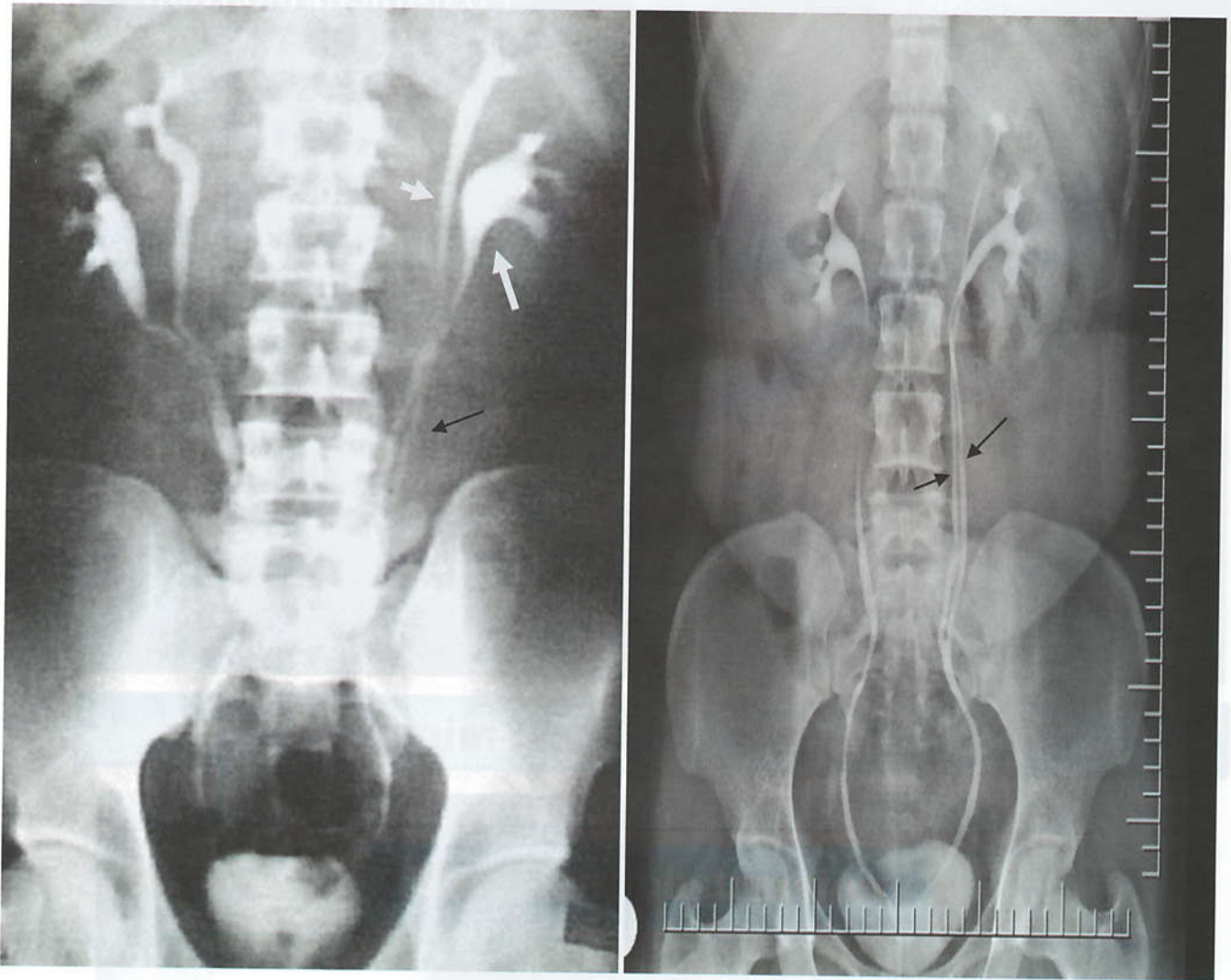
catheter

**Normal ascending cystography**

**Normal micturating cysto-urethrography**



# Congenital Anomalies

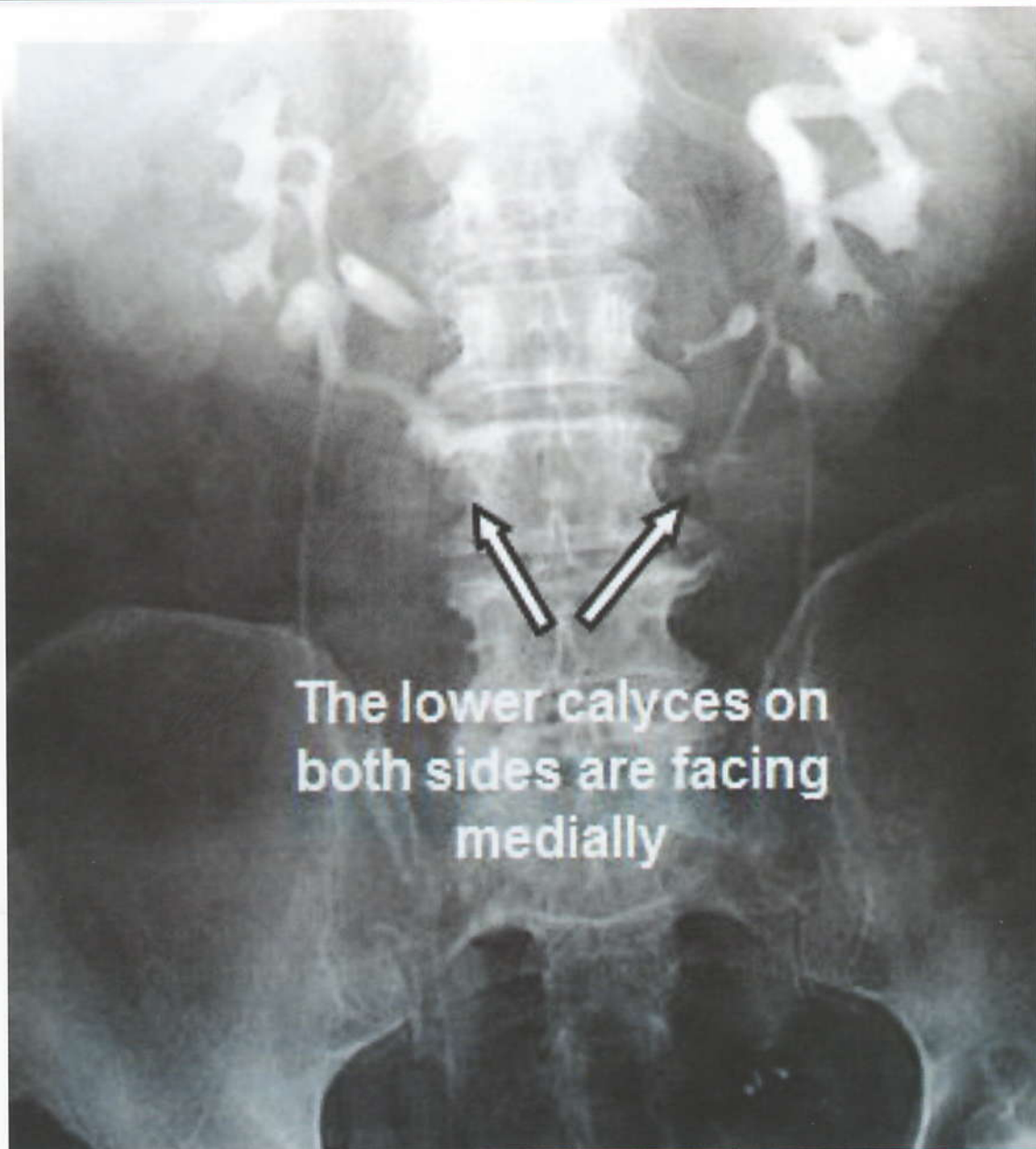


## Double Pelvis & Ureter

### Questions (True or false)

1. This condition is usually asymptomatic & accidentally discovered( )
2. The lesion may be complete or incomplete. ( )
3. This study is contraindicated in cases with iodine allergy ( )
4. The underlying cause is congenital ( )
5. Stone formation is a common complication ( )
6. Surgical treatment is indicated only if the patient is complaining( )

## Congenital Anomalies

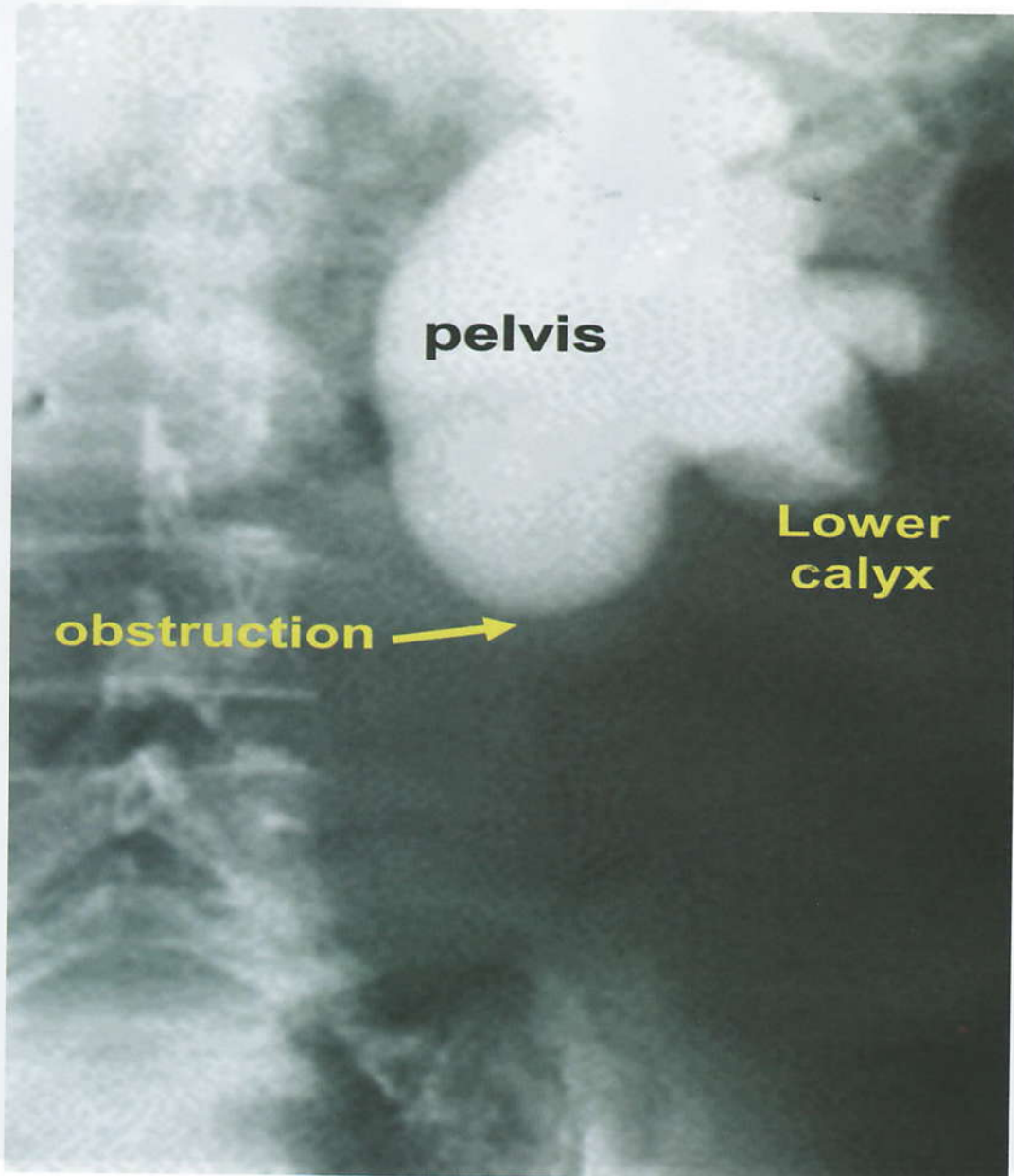


### Horse-shoe kidney

- IVU
- Bilateral mal-rotation of kidneys, as evidenced by the medially-facing lower calyces, is diagnostic of horse-shoe kidney.
- Usually asymptomatic but may cause pressure on ureter, may present by abdominal mass at umbilicus, as it is arrested at inferior mesenteric artery at level of L3.



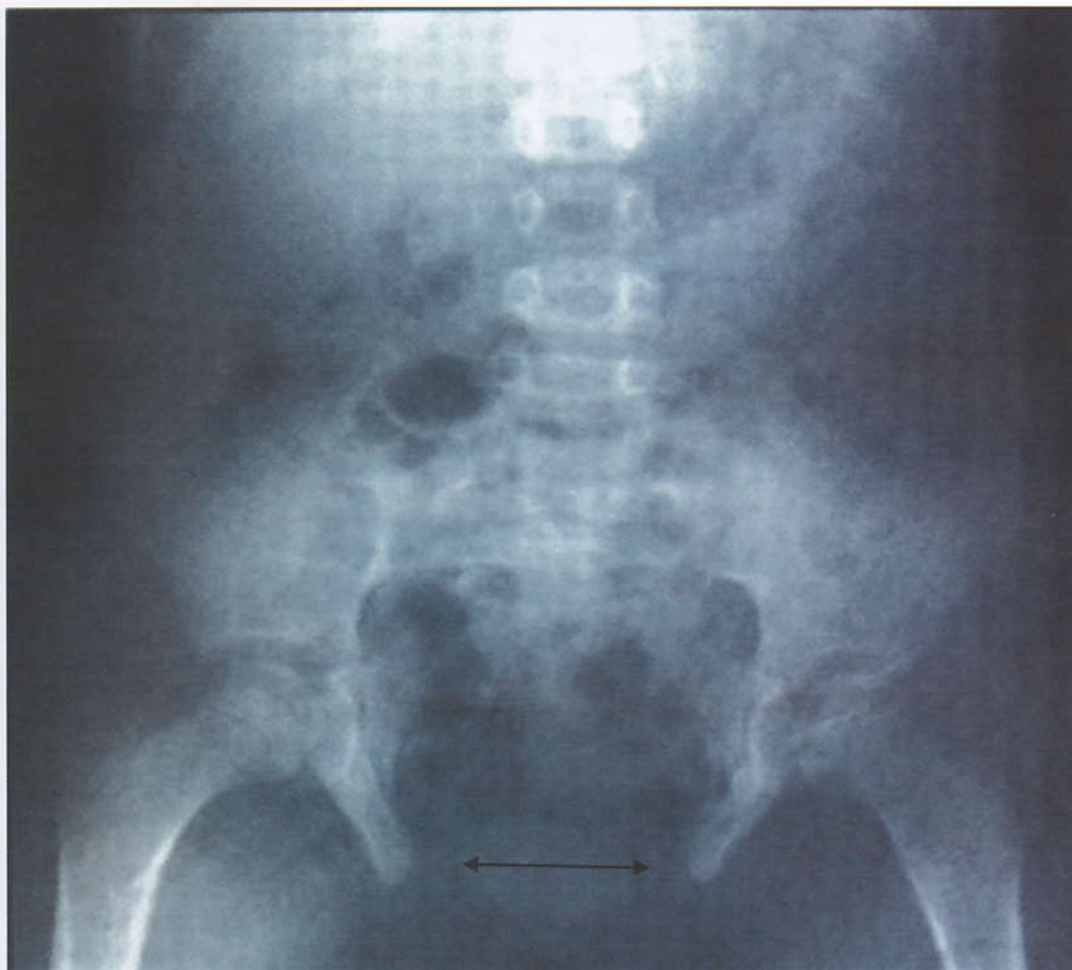
## Congenital Anomalies



### Pelvi-Ureteric Junction (PUJ) obstruction

- IVU
- The left renal pelvis and the calyces are markedly distended
- Obstruction is at the pelvi-ureteric junction (PUJ)
- There are several causes of this, the most usual of which is idiopathic PUJ obstruction

# Congenital Anomalies



## Ectopia vesicae

- Plain X-ray
- Wide separation of pubic bones
- Ectopia vesicae (bladder extrophy)

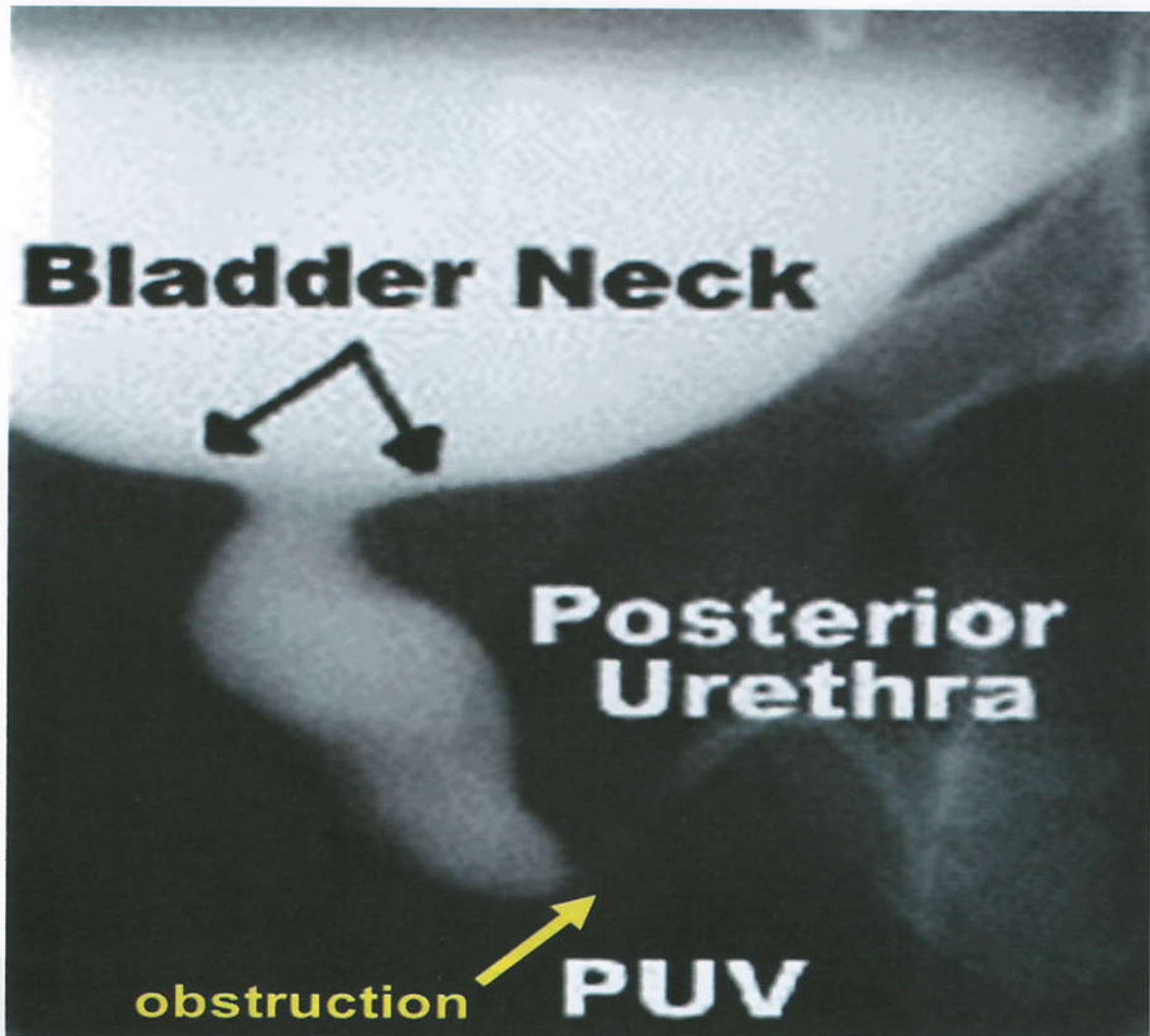


## Questions (True or false)

7. Wide separation of pubic bone ( )
8. Absence of the pubic and ischial rami is seen in this x-ray ( )
9. A horse shoe kidney is seen in this x-ray ( )
10. There is an irregular filling defect in the bladder ( )
11. This patient is incontinent to urine ( )
12. Waddling gait is a common presentation ( )
13. Malignancy is a possible complication ( )
14. Renal failure is a common complication ( )
15. Antibiotics can be given to this patient ( )
16. Surgery is the only line of treatment ( )



## Congenital Anomalies



### Posterior urethral valve

- Micturition cysto-urethrography
- Obstruction of posterior urethra with proximal urethral dilatation
- Posterior urethral valve

# UT Injuries



## Kidney injury

- IVU
- Escape of contrast material out of renal pelvis
- This is right kidney deep laceration

## Questions (True or false)

17. This a plain x -ray abdomen erect ( )
18. The underlying cause could be malignant invasion ( )
19. There is evidence of left sided renal injury ( )
20. This patient may present with abdominal distention and vomiting ( )
21. Terminal Haematuria is a common feature ( )
22. Shock may be a possible complication ( )
23. CT abdomen is the investigation of choice ( )
24. Antibiotics can be a line of treatment ( )
25. The principle treatment is right side nephrectomy ( )
26. Surgery is reserved for complicated cases only ( )



## UT Injuries



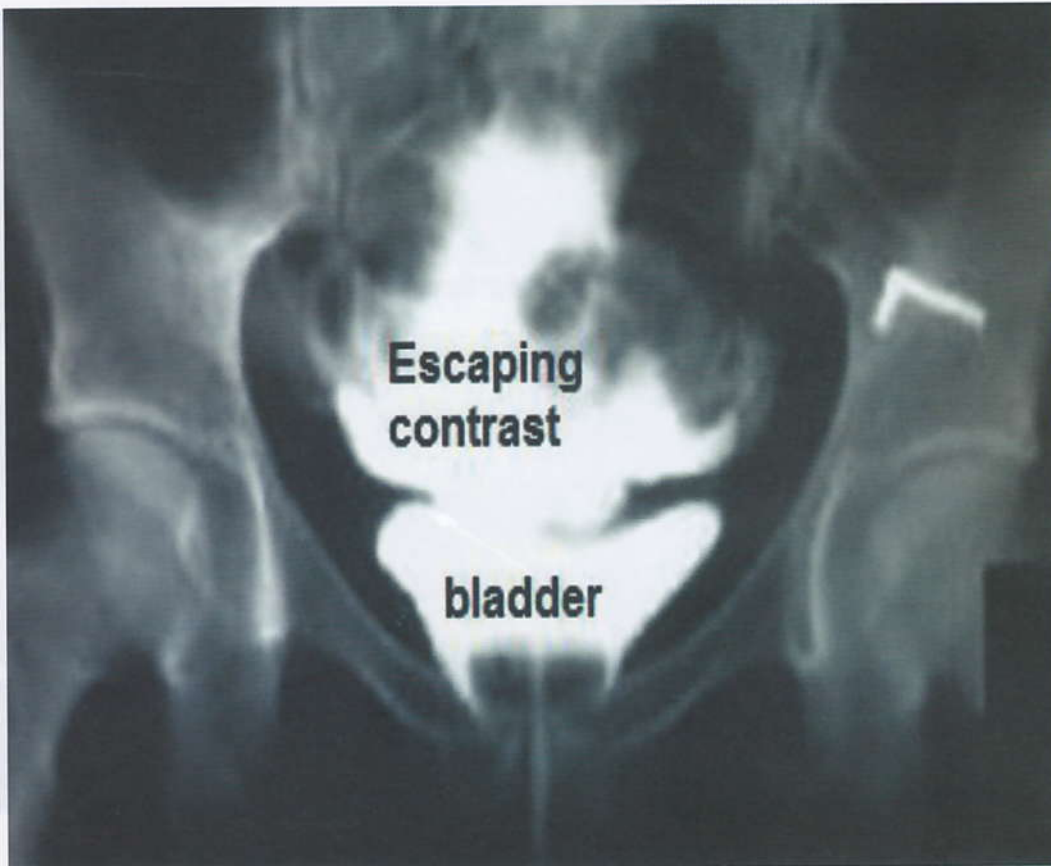
### Ureteric Injury

- IVU
- Showing escape of contrast material from the injured ureter
- The majority of ureteric injuries are iatrogenic

### Questions (True or false)

27. The main cause of ureteric injury is iatrogenic during ureteric catheterization. ( )

# UT Injuries



## Urinary Bladder Injury

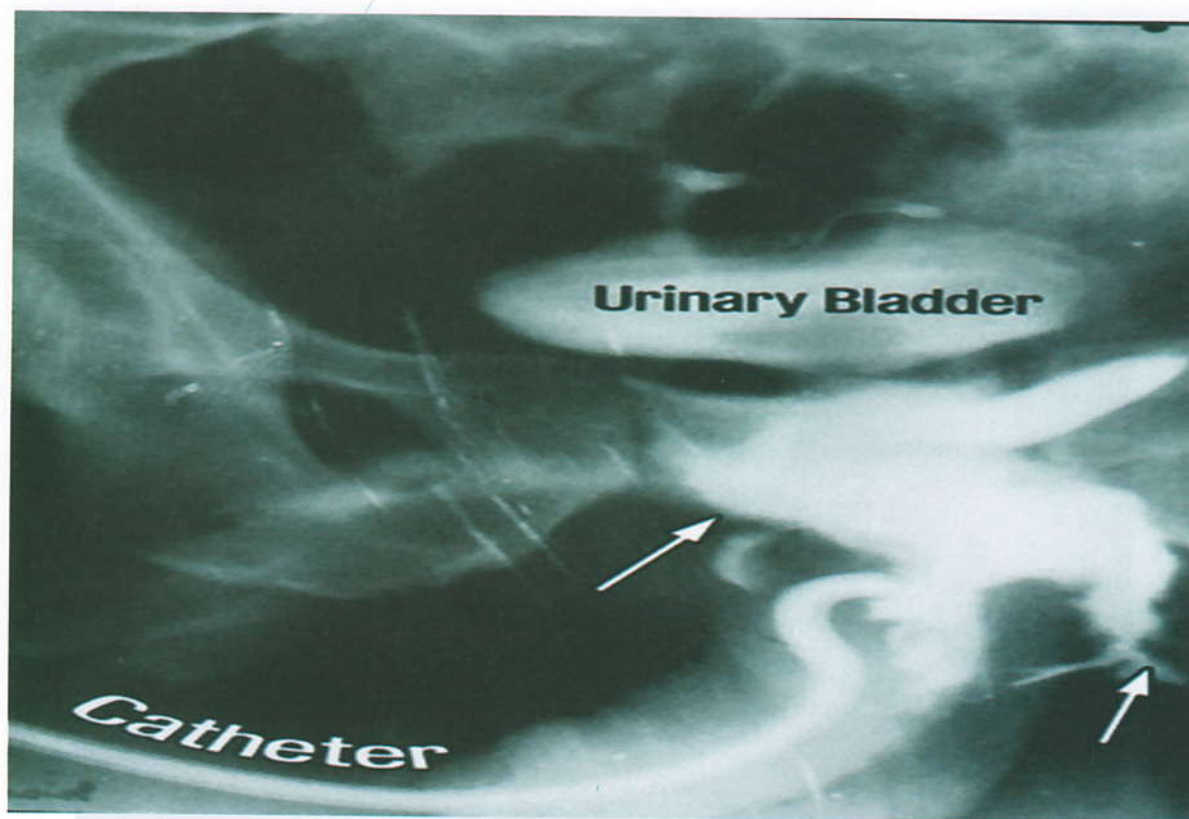
- Ascending cystography
- Free escape of contrast upwards
- Intra-peritoneal rupture of the bladder

### Questions (True or false)

28. This investigation is ascending cystography. ( )
29. There is leak of the dye seen in the peri-vascular space ( )
30. The common underlying cause is fracture pelvis ( )
31. Patients may present with urine retention. ( )
32. Abdominal distention and vomiting are common features ( )
33. This patient may present with Haematuria ( )
34. Peritonitis is a common complication ( )
35. Shock is a possible complication ( )
36. Urgent catheterization is required. ( )
37. Surgical treatment is the only line of treatment. ( )
38. Urgent surgical exploration is indicated ( )
39. Supra-pubic cystostomy is the main line of treatment ( )



## UT Injuries



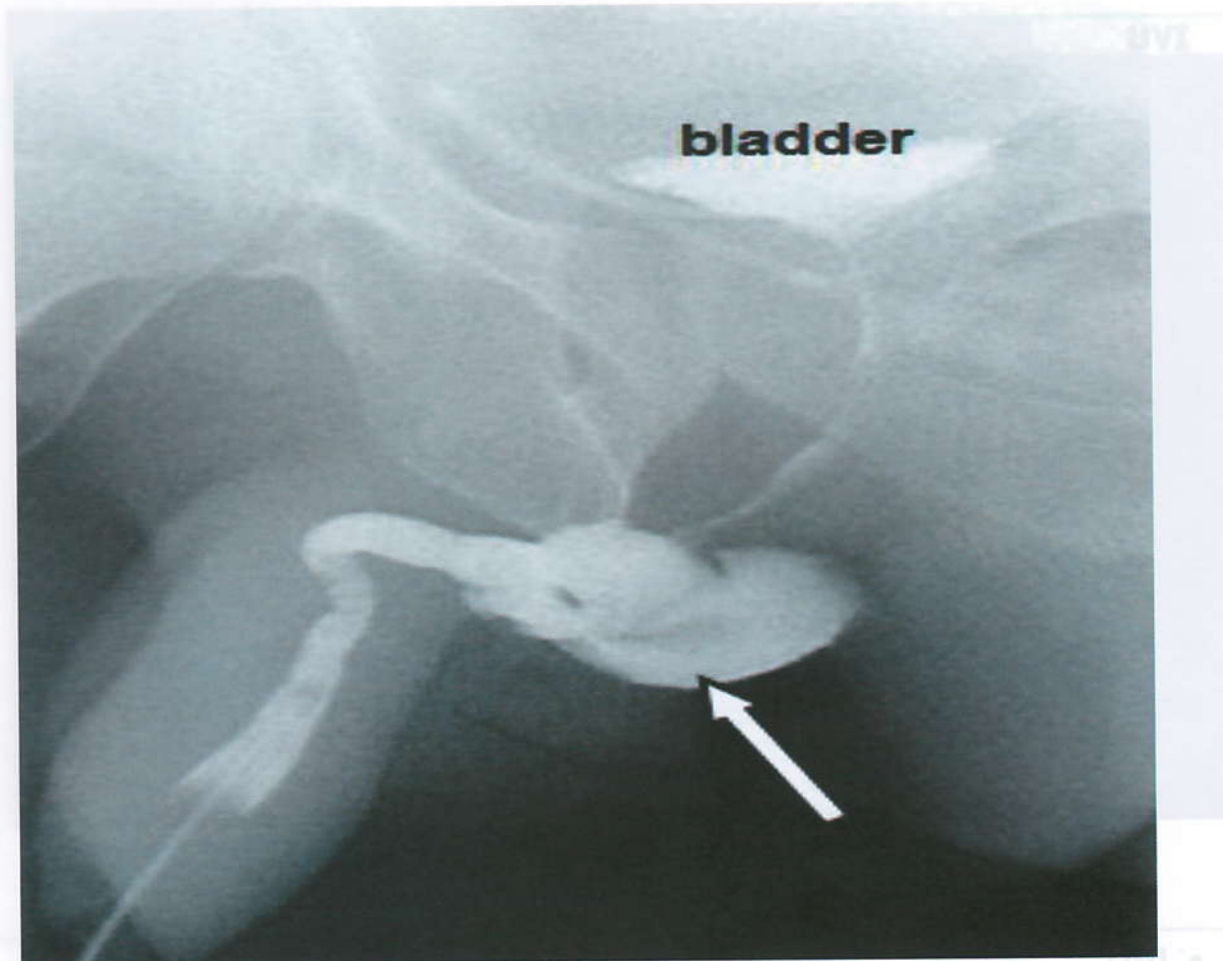
### Urethral Injury

- Ascending cystourethrography
- Escape of contrast from an injury in posterior urethra.
- The injury does not include the whole circumference because some of the contrast material entered the bladder
- Intra-pelvic rupture of the urethra

### Questions (True or false)

40. Bladder visualization indicates that urethral injury does not include the whole urethral circumference. ( )
41. This is an ascending Cysto-urethrogram ( )
42. Rupture posterior urethra usually results from fracture pelvis. ( )
43. This patient may present with hematuria. ( )
44. Urethral stricture is the most common complication. ( )
45. Urgent catheterization is indicated. ( )
46. This is a rupture of the urinary bladder ( )
47. The bladder is visualized by the dye ( )
48. This patient may present with urine retention ( )
49. Urgent surgery is required for the treatment of this condition ( )
50. Supra-pubic cystostomy tube is needed ( )

## UT Injuries

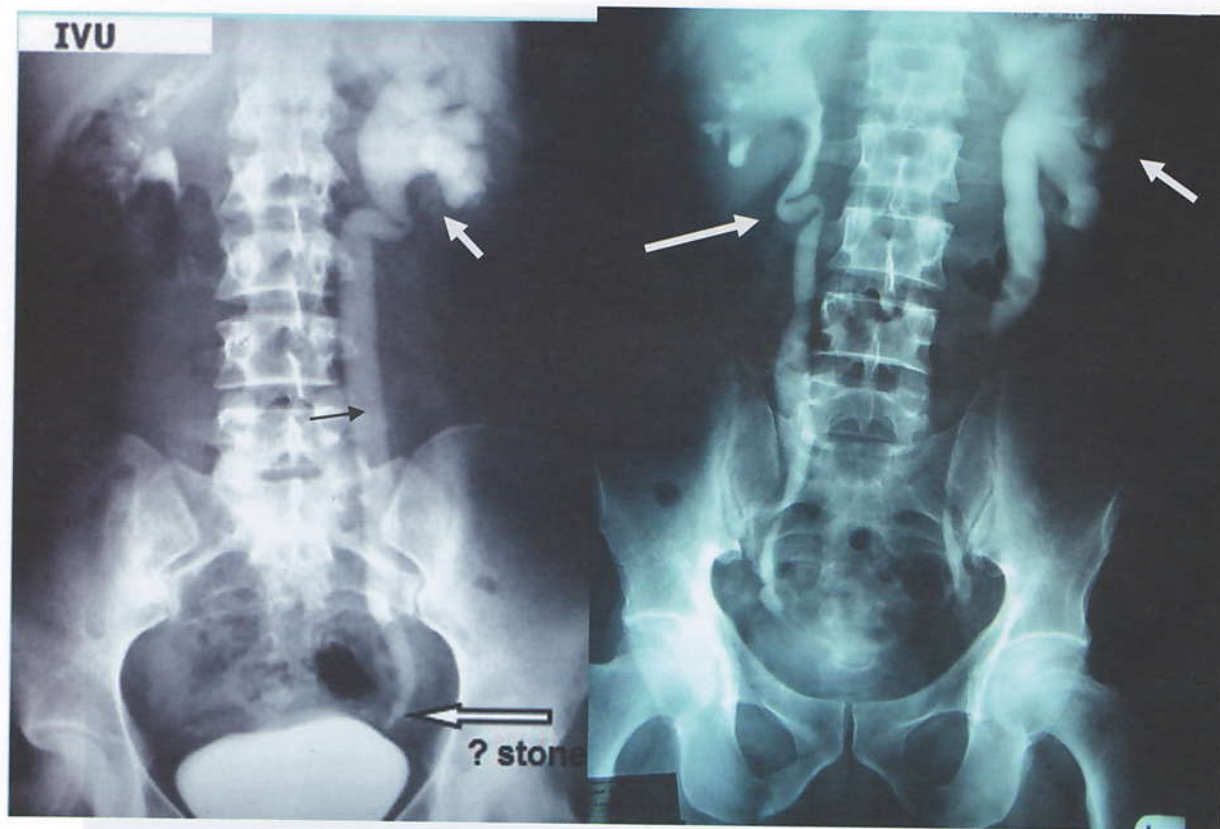


### Urethral Injury

- Ascending cystourethrography
- Escape of contrast from an injury in anterior urethra. The injury does not include the whole circumference because some of the contrast material entered the bladder
- Anterior urethral injury



# Hydronephrosis



## Hydroureter and hydronephrosis

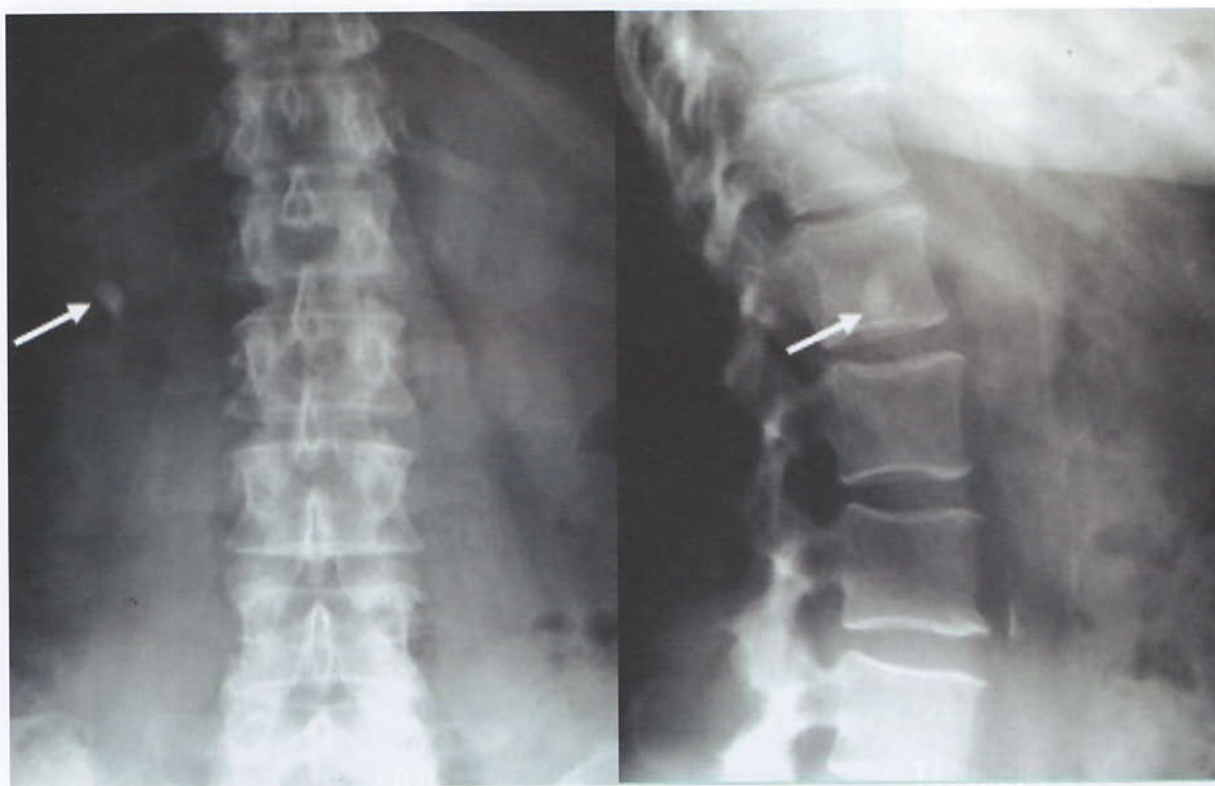
- IVU
- Left hydroureter and hydronephrosis possibly caused by a stone in lower ureter.
- Plain UT should be checked to look for this stone

- IVU
- Bilateral hydroureter and hydronephrosis, probably caused by ureteric stricture.
- A common cause is Bilharziasis

## Questions (True or false)

51. The contrast used contains iodine ( )
52. The dye was given intravenous ( )
53. This patient is presenting with chronic renal failure ( )
54. This patient may present with abdominal pain and loin swelling ( )
55. Haematuria is the main presentation ( )
56. Pyonephrosis is a common complication ( )
57. Renal isotopic scan can help in the diagnosis ( )
58. Abdominal sonar is an essential investigation ( )
59. Treatment of the cause of mass ( )
60. Nephrostomy can be a line of treatment ( )

# Stones



## Renal stone

- Plain UT, A-P view, showing a radio-opaque shadow in the region of right kidney.
- Differential diagnosis includes gall stone.
- A lateral view shows that the shadow lies posteriorly on the spine.
- Most ( $\approx 85\%$ ) of UT stones are radio-opaque.
- UT stones can affect adults and children and may be multiple
- This is a right renal stone

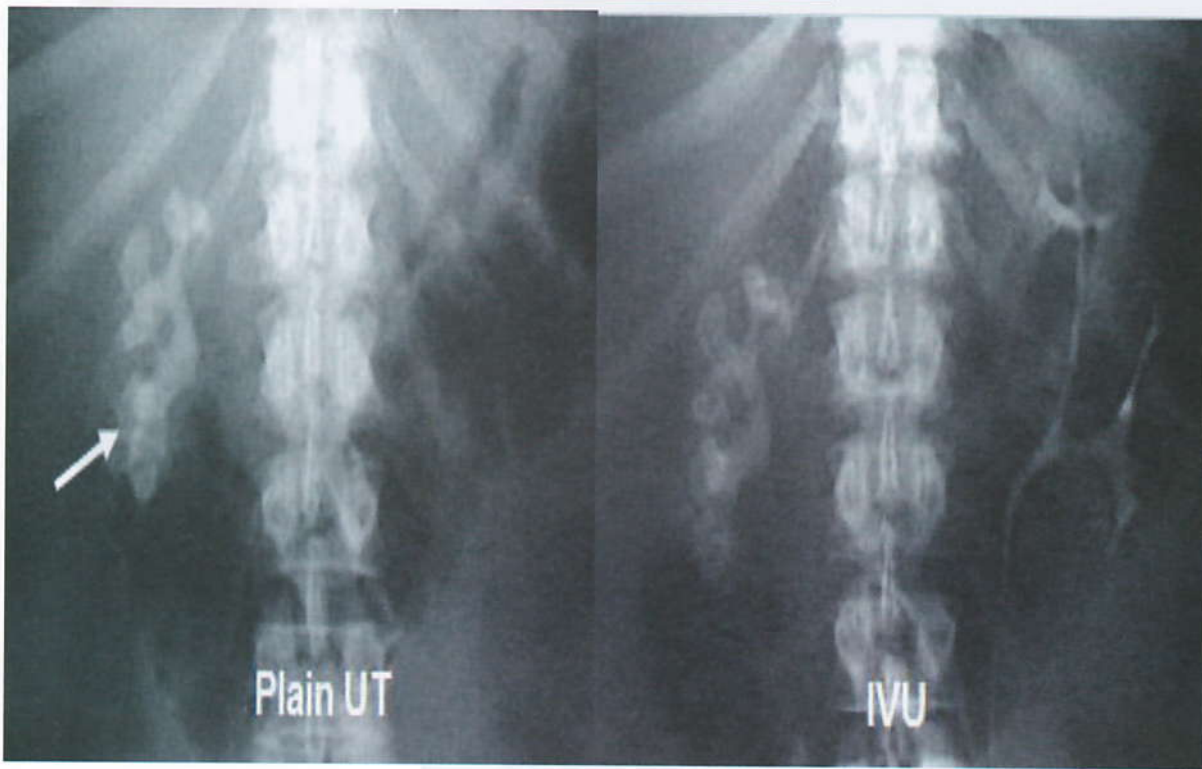
## Questions (True or false)

- |                                                                    |     |
|--------------------------------------------------------------------|-----|
| 61. This is a plain x-ray                                          | ( ) |
| 62. This is an intravenous Pyelography                             | ( ) |
| 63. Radio-opaque shadows are seen                                  | ( ) |
| 64. About 5% of renal stones are radiolucent.                      | ( ) |
| 65. Hyperthyroidism is important cause of multiple urinary stones. | ( ) |
| 66. This patient may present with Carpo-pedal spasm                | ( ) |
| 67. Loin pain is a common clinical presentation                    | ( ) |
| 68. Hydroureter and hydronephrosis are possible complications      | ( ) |
| 69. Abdominal ultrasound can help in the diagnosis                 | ( ) |
| 70. The next investigation is needed is CT abdomen                 | ( ) |
| 71. ESWL can be a line of treatment                                | ( ) |

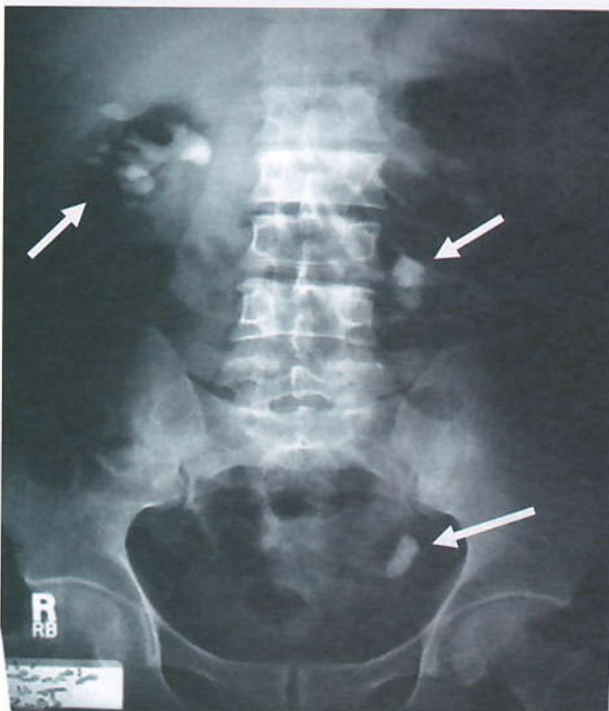


# Stones

## Renal stone

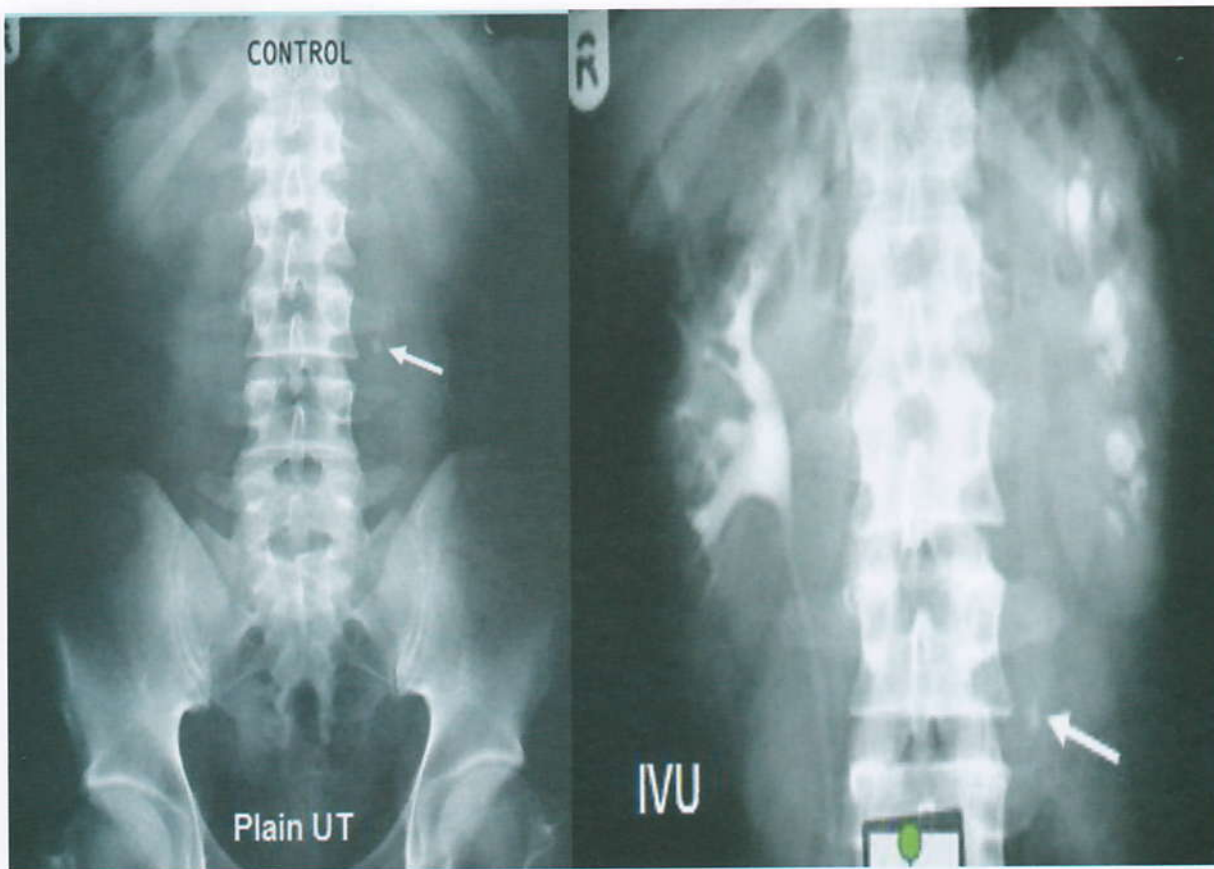


- Right kidney stag-horn stone
- These are phosphate stones that are usually related to infection and commonly affect function of the affected kidney



- Plain UT showing multiple radio-opaque shadows suggestive of right kidney and left ureter stones.
  - An IVU is needed for confirmation.
  - Multiple stones raise suspicion of *hyperparathyroidism*
    - Hyperparathyroidism should be treated 1<sup>st</sup> then
    - Remove the stones, to avoid entry in a medical
    - Emergency due to stress
- If multiple stones, treat urethra then ureter then renal stones in that order UB stones lastly.

# Stones



## Ureteric stone

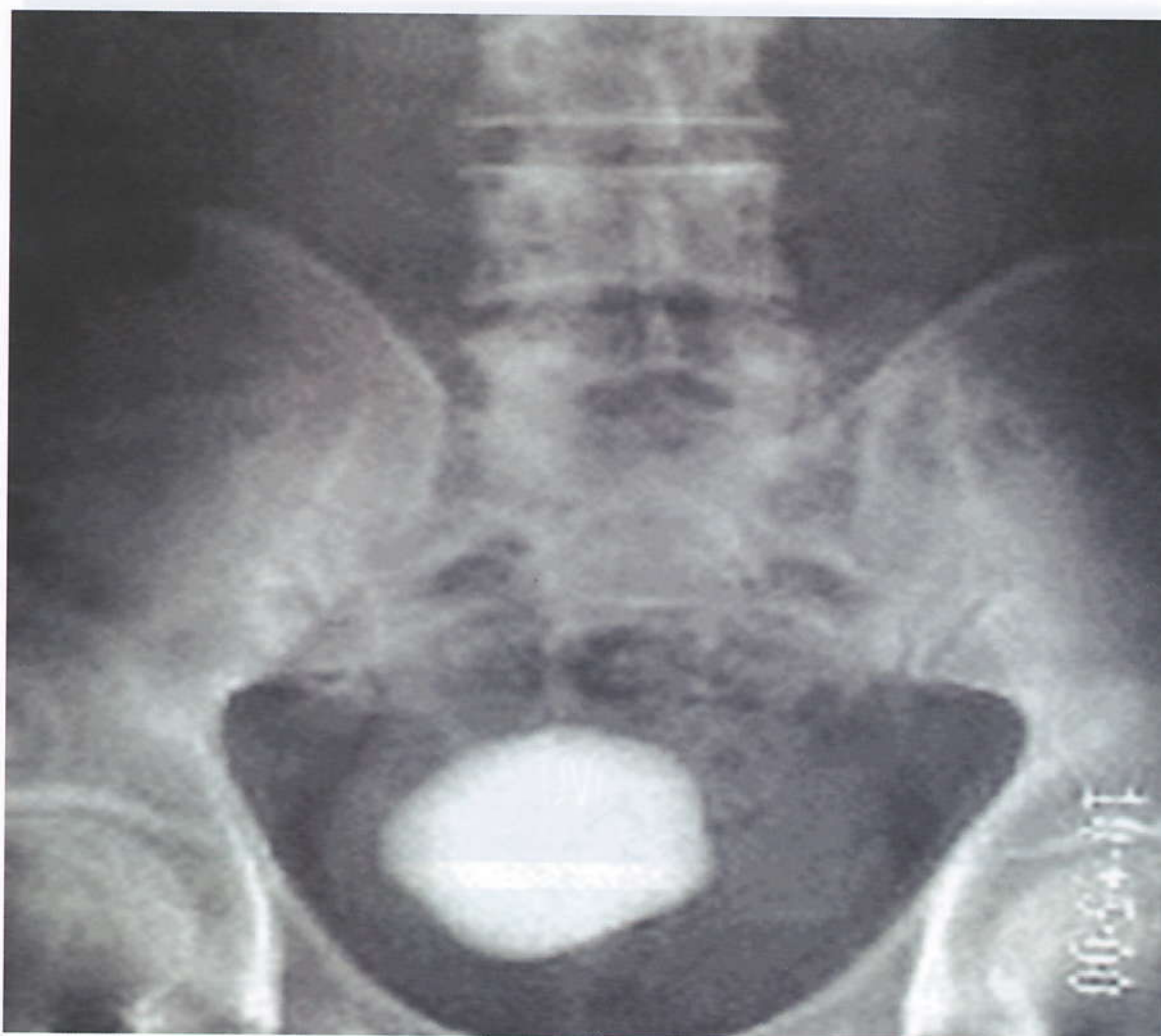
- Patient has left renal colic
- Radio-opaque shadow in the course of abdominal part of left ureter
- Left ureter stone and left hydronephrosis

## Questions (True or false)

72. There is a radio-opaque shadow in the ureter ( )
73. IVU is indicated for this condition ( )
74. Bilharzias is can be a possible predisposing factor ( )
75. This patient may present with burning micturition ( )
76. This patient can present with a colicky loin pain ( )
77. Acute appendicitis can be D.D from Rt. side lesion ( )
78. Abdominal sonar is a useful investigatio ( )
79. ESWL can be a line of treatment ( )
80. Dormia Basket can be a line of treatment ( )
81. Surgery is the best line of treatment for this condition ( )



# Stones



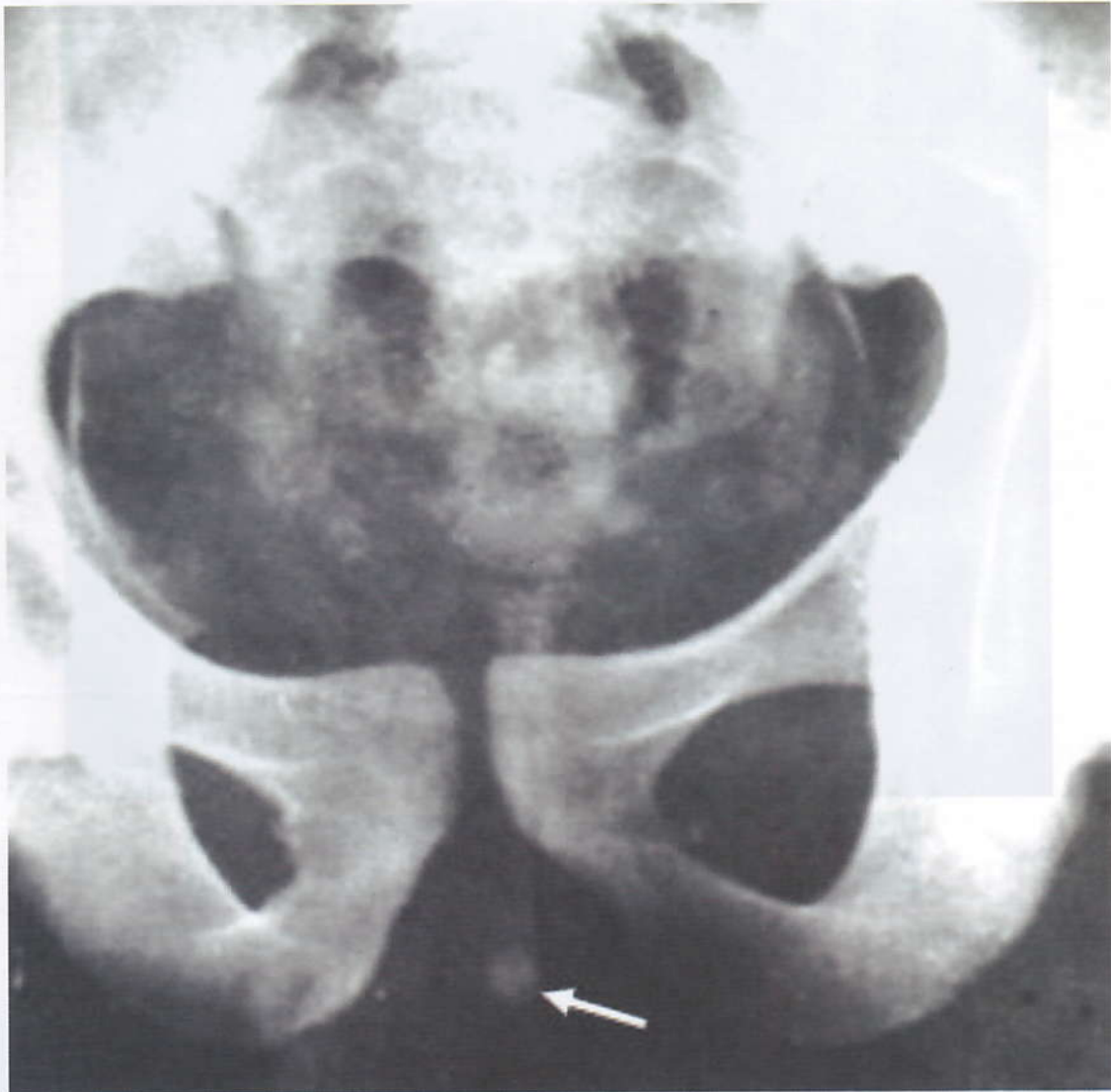
## Urinary bladder stones

- Plain X-rays of pelvis showing radio-opaque shadows in the region of the urinary bladder

## Questions (True or false)

82. This is a plain x-ray ( )
83. This patient can present with painless Haematuria ( )
84. IVU is indicated for this patient ( )
85. Frequency and Dysuria are a common presentation ( )
86. This patient can present with terminal Haematuria ( )
87. This stone can pass spontaneously during micturition ( )
88. Acute retention of urine is a possible complication ( )
89. Abdominal sonar is a useful investigation ( )
90. Surgery is the best line of treatment for this patient ( )
91. Cystolithotomy is the treatment of choice ( )

# Stones



## Urethral stone

- Plain X-rays showing radio-opaque shadow below the level of symphysis pubis
- Stone in anterior urethra
- A posterior urethral stone casts a shadow opposite the symphysis pubis



# Prostate



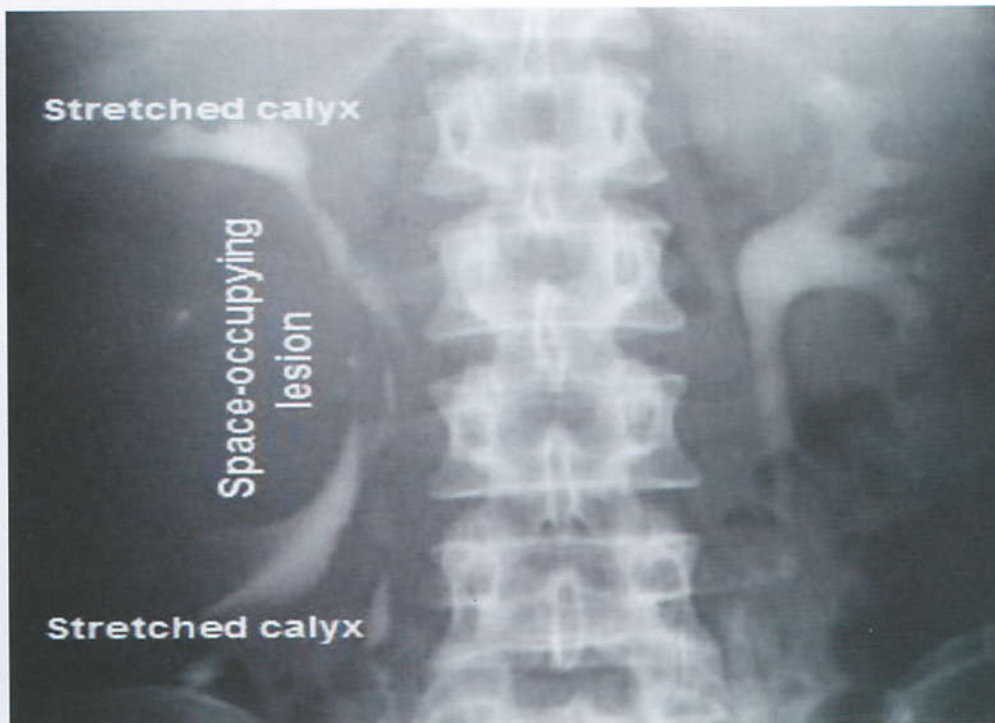
## Benign prostatic hyperplasia

- Descending cystogram showing a smooth elevation of bladder base with sacculation of bladder wall
- Radiographic diagnosis is benign prostatic hyperplasia (BPH)

## Questions (True or false)

92. Cystography may show chronic urinary retention & diverticulum formation in the bladder secondary to SEP. ( )
93. Conservative medical treatment is contraindicated once acute retention occurred. ( )
94. TURP is the best line of surgical treatment. ( )
95. The underlying cause is a benign adenomatous disease ( )
96. This patient may present with acute urine retention ( )
97. may be complicated with ascending urinary tract infection ( )
98. This patient may present with bilateral groin swellings ( )
99. Bilateral hydronephrosis is a possible complication ( )
100. Renal failure could be a complication in neglected cases ( )
101. Frequency and burning micturation are common presentations ( )
102. Malignant transformation is a possible complication ( )
103. Trans rectal ultrasound is useful ( )

# Tumors



## Renal cell carcinoma

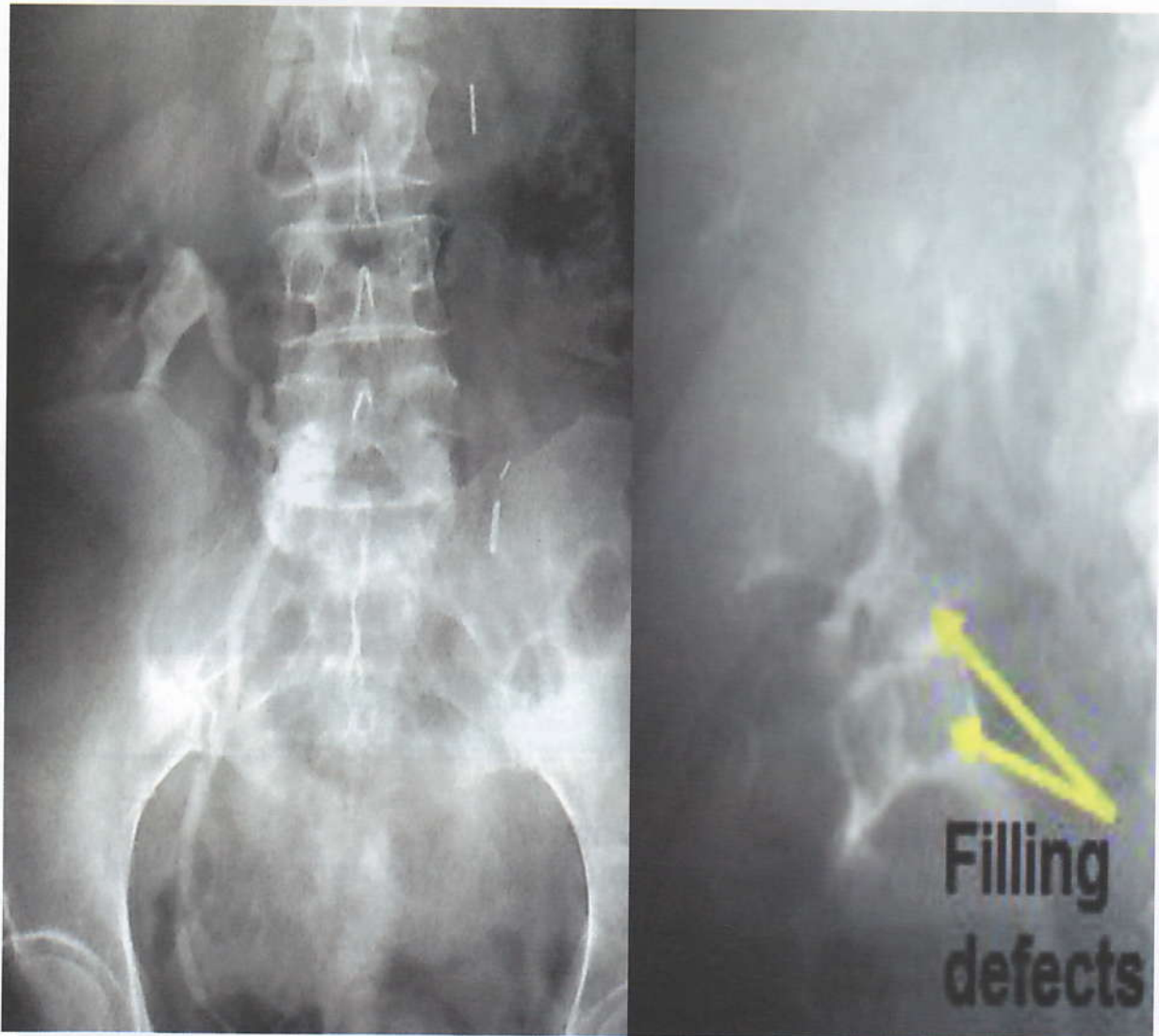
- IVU
- Painless recurrent total haematuria
- IVU showing a space-occupying lesion in right kidney that stretches the calyces.
- Radiologically this might be a cyst or a solid mass (cancer)
- U/S showed this to be a solid mass
- Renal cell carcinoma (hypernephroma)

## Questions (True or false)

104. This is a left sided peri-nephric abscess ( )
105. This patient may present with Necroturia ( )
106. Painless Haematuria is the commonest presentation ( )
107. The common site of this lesion is the lower pole of the kidney ( )
108. Varicocele is a common complication ( )
109. Hypertension is a possible complication ( )
110. Urine cytology can confirm the diagnosis ( )
111. CT abdomen is the investigation of choice ( )
112. Nephrectomy is the best line of treatment of this condition ( )
113. Nephrostomy is the principle treatment for advanced cases ( )



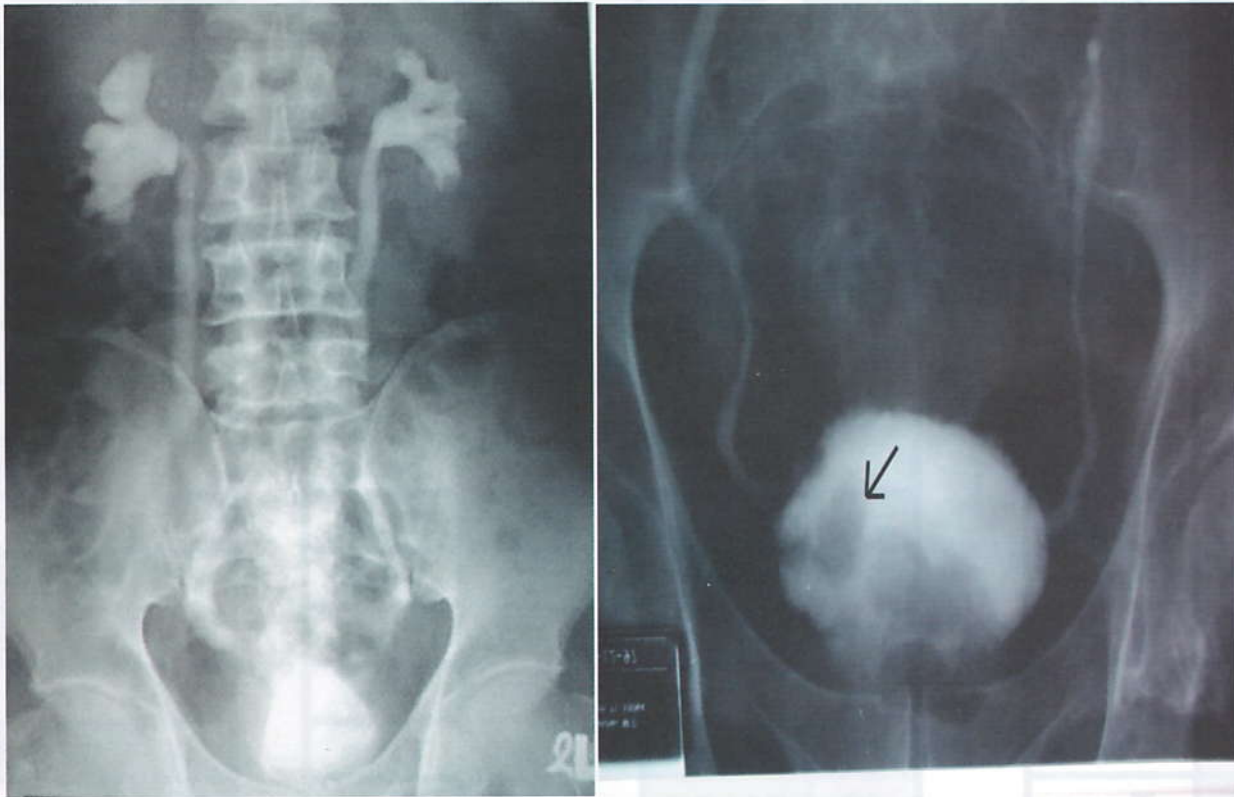
# Tumors



## Transitional cell carcinoma (TCC)

- Left nephro-ureterectomy for TCC of left kidney 1 year ago.
- Recurrence of haematuria.
- IVU shows filling defects of right renal pelvis
- Radiologic differential diagnosis: recurrent TCC, radiolucent stones & blood clots
- Transitional cell carcinoma (TCC) of right renal pelvis

# Tumors



## Carcinoma of urinary bladder

- IVU showing an irregular filling defect of the urinary bladder
- Bilateral hydroureter and hydronephrosis
- Radiographic diagnosis is carcinoma of urinary bladder
- The next step is cystoscopy and biopsy

### Questions (True or false)

- |                                                                 |     |
|-----------------------------------------------------------------|-----|
| 114. There is a lateral wall filling defect seen in the bladder | ( ) |
| 115. The contrast used is Urographin                            | ( ) |
| 116. This condition is commonly associated with Haematuria      | ( ) |
| 117. The underlying cause is a benign adenomatous disease       | ( ) |
| 118. This patient can present with Necroturia                   | ( ) |
| 119. Bilharziasis is a major underlying cause                   | ( ) |
| 120. The age of this patient is under 18 years                  | ( ) |
| 121. This investigation may cause ascending Pyelonephritis      | ( ) |
| 122. Cystoscopy is indicated for this condition                 | ( ) |



# Key answer

|    |       |
|----|-------|
| 1  | True  |
| 2  | True  |
| 3  | True  |
| 4  | True  |
| 5  | FALSE |
| 6  | True  |
| 7  | True  |
| 8  | True  |
| 9  | FALSE |
| 10 | FALSE |
| 11 | True  |
| 12 | True  |
| 13 | True  |
| 14 | True  |
| 15 | True  |
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| 31 | FALSE |

|    |       |
|----|-------|
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| 57 | True  |
| 58 | True  |
| 59 | True  |
| 60 | True  |
| 61 | True  |
| 62 | FALSE |

|    |       |
|----|-------|
| 63 | True  |
| 64 | True  |
| 65 | False |
| 66 | FALSE |
| 67 | True  |
| 68 | FALSE |
| 69 | True  |
| 70 | FALSE |
| 71 | True  |
| 72 | True  |
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| 79 | FALSE |
| 80 | True  |
| 81 | True  |
| 82 | True  |
| 83 | FALSE |
| 84 | True  |
| 85 | True  |
| 86 | True  |
| 87 | FALSE |
| 88 | True  |
| 89 | True  |
| 90 | True  |
| 91 | True  |
| 92 | True  |
| 93 | FALSE |

|     |       |
|-----|-------|
| 94  | True  |
| 95  | True  |
| 96  | True  |
| 97  | FALSE |
| 98  | True  |
| 99  | True  |
| 100 | True  |
| 101 | True  |
| 102 | FALSE |
| 103 | True  |
| 104 | FALSE |
| 105 | FALSE |
| 106 | True  |
| 107 | FALSE |
| 108 | True  |
| 109 | FALSE |
| 110 | FALSE |
| 111 | True  |
| 112 | True  |
| 113 | FALSE |
| 114 | True  |
| 115 | True  |
| 116 | True  |
| 117 | FALSE |
| 118 | True  |
| 119 | True  |
| 120 | FALSE |
| 121 | FALSE |
| 122 | True  |



## Important points & tweets based on our questions

**Q1:** Double ureter & double pelvis is the commonest anomaly in urinary system affecting 4% of population, usually asymptomatic, Double ureter is more common in females & may present by hydronephrosis or frequent UTI.

**N.B:**

- Horseshoe kidney: Usually asymptomatic but may cause pressure on ureter, may present by abdominal mass at umbilicus, as it is arrested at inferior mesenteric artery at level of L3.
- Horseshoe kidney is prone to disease because of ureteric obstruction, may result from angulation of ureter as it crosses the isthmus, stasis favor infection & stones.
- Horseshoe kidney Ttt only indicated for complicated cases.. isthmus division is rarely needed.
- PUJ may be congenital ( abnormal valve or aberrant artery ) or acquired ( stone at PUJ).
- Most frequent finding in ..( infants → abdominal mass ) ( children → intermittent flank pain following fluid intake).
- Pyeloplasty .. to create funnel shaped PUJ of adequate caliber (Anderson –Hynes operation).

**Q7:** Ectopia vesicae common in males (4:1), absent lower anterior abdominal wall & anterior wall of bladder, urine spurts onto abdominal wall.

**Q12:** widened symphysis pubis → waddling gait.

**Q13:** bladder mucosa appears normal at birth, but persistent irritation & recurrent infection leads to chronic inflammation & malignant transformation. Also complicated by sterility.

**N.B:** posterior urethral valve is ttt by urethroscope & vulguration.

**Q18:** Renal injury,

- Commonest cause is blunt trauma (80-85%) either direct or indirect
- Penetrating wounds
- Iatrogenic.

**Q20:** Presented by, pain localized in renal area, nausea, vomiting & abdominal distension due to intestinal atony due to retroperitoneal bleeding, oliguria, retention

**Q21:** Haematuria usually with the 1<sup>st</sup> voiding, but may be late due to hypotension, usually terminal haematuria, may be absent in 30% of cases ( either due to complete avulsion of pedicle or ureteric injury ).

**Q22:** complicated by renovascular hypertension, hydronephrosis, renal atrophy & shock.

**Q24:** It is acute emergency, most renal injuries cured conservative ( hospitalization, analgesics, antibiotics & large fluid intake)

**Q26:** surgery done in certain indications ( perirenal infection, penetrating wound, progressive enlarging perirenal mass, progressive hematuria ).



- Q27:** Ureteric injury usually iatrogenic, extravasation of urine either intraperitoneal or extraperitoneal, investigated by sonar, intravenous pyelography, ttt usually surgical.
- Q30:** UB injury either intraperitoneal (20%) or extraperitoneal (80%), fracture pelvis is the commonest cause for extraperitoneal injury, in this picture it is intraperitoneal extravasation so the answer is false.
- Q31:** • **In extravasation rupture** .. hypovolemic shock Urine start to collect in retropubic space (cavity of retzuis), intense desire to void, patient may pass few drops of blood stained urine or none at all, boggy swelling in supra pubic space to differentiate it from intrapelvic rupture of urethra.  
• **In intraperitoneal rupture**, fullness in rectovesical pouch, peritonism, passing catheter brings no urine, severe oliguria or anuria.
- Q37:** TTT:
- Management of shock
  - For small extraperi. With minimal extravasation → catheter drainage for 2 weeks till healing occurs
  - Large extraperi. & intraperi. Needs repair \* Antibiotics \* ttt of fracture.
- Q42:** Injury of posterior urethra (intrapelvic) usually due to pelvic fracture & iatrogenic, anterior urethra (extrapelvic) by falling astride.
- Q43:** Pt unable to void, but feels the desire to micturate, floating prostate by DRE
- Q45:** whenever urethral injury is suspected catheterization of bladder is contraindicated
- Q53:** Hydronephrosis usually present by dull aching pain, swelling may in late stage fill the renal angle, polyuria of low specific gravity
- Q56:** Stasis leads to infection & pyonephrosis
- Q58:** Abd. US detect renal size, renal cortex thickness, may show the cause  
IVU shows: dilated renal pelvis, PUJ distorted & raised upwards, loss of cupping, clubbing & later ballooning of minor calyces, delayed excretion of contrast.
- Q59:** Ttt of the cause, nephrectomy avoided, Nephrectomy done in Hydronephrosis only if (kidney is non functioning with infusion urography / US shows very thin parenchyma / renal scan shows zero function / normal opposite kidney).
- Q60:** In compromised cases with bad other kidney, nephrostomy done & may be left for long time till obstruction is treated.
- Q63:** 90% of urinary calculi are radioopaque (calcium is the densest then  $\text{Ca}^{++}$  oxalate, struvate).
- Q65:** Aetiology may be due to stasis, or ↑ constituents like  $\text{Ca}^{++}$  as in Hyperparathyroidism & prolonged immobilization.
- Q68:** Hydroureter & hydronephrosis are common complications, but in that picture it is arenal not ureteric stone.  
**other complications** • infection • Haematuria • Metaplasia of renal tissue \* deterioration of renal functions.



- Q69:** Abd. US is simple, can visualize the kidney & degree of obstruction & can diagnose UB stones.
- Q74:** Bilharziasis cause stasis, change pH, deposit debris & blood so increase ureteric stones.
- Q75:**
- Ureteric stone cause colicky pain in the loin referred to groin or testicles in males, labia majora in females, pain occur as stone moves along ureter.
  - Pain at end of micturation and tip of penis if stone impacted at lower end of ureter associated with frequency & strangury.
- Q78:** Abdominal sonar is NOT reliable to visualize Ureteric stones.
- Q80:** for upper 1/3 stones (if >1cm → open surgery) (if <1cm → ESWL after pushing stone to kidney)
- For middle 1/3 → open surgery is best, ESWL is very difficult
  - lower 1/3 → ureteroscopy or open surgery.
- Q85:**
- Difficult micturation & interruption of stream
  - Frequency due to irritation of bladder mucosa, at 1<sup>st</sup> (only during the day) then (durinal & nocturnal) due to cystitis
- Q86:** Terminal haematuria, few drops, due to abrasion of trigone.
- Q90:** UB stones ttt is by surgery
- if <2cm → cystoscopic litholapaxy
  - if >2cm or multiple or very hard or at diverticulum or in child → cystolithotomy.
- Q96:** Acute retention of urine may be the 1<sup>st</sup> presentation, ppt by excess fluid intake, diuresis, constipation, cold weather, alcoholic ... it is very painful needs urgent intervention.
- Q97:** cystitis is common and when happens convert the frequency and urgency symptoms from nocturnal to both nocturnal & durinal.
- Q98:** suprapubic mass (full bladder) can be felt.
- Q100:** chronic retention with overflow can happen as bph progress, UB turn atonic & pt involuntarily voids small amounts when untravesical pressure increase haematuria if enlarged prostate compress prostatic venous plexus leading to congestion of veins at prostate base .. and gross haematuria may happen.
- Q101:** Frequency & urgency are early symptoms, at 1<sup>st</sup> nocturnal then all the day & night
- Q103:** TRUS is useful to uncover nonpalpable malignancy in peripheral zone, & can take biopsy assess size of enlargement & its pattern.



- Q104:** RCC is adenocarcinoma, arises from cells of PCT, lesion shows clear cell pattern & cholesterol crystals. RCC is the commonest renal neoplasm (75% of all renal tumors) more in males, more to be unilateral, usually above 50-70 years.
- Q106:** Haematuria present in 50% of cases. (painless, recurrent, profuse, total) pain in 40% (due to stretch of renal capsule by neoplasm or passage of blood clot cause ureteric calculi), mass in 30% .... The classical triad in 10% of cases the triad usually indicates advanced cases.
- Q108:** Rapidly 2ry enlarging varicocele that does not empty by scrotal elevation suggest RCC.
- Q109:** systemic syndromes as Amyloidosis, polycythemia & hypercalcemia in 5% of cases.
- Q111:** CT abdomen is mandatory, very accurate in detecting exact size, site consistency of lesion, detect invasion of renal capsule, LNS enlarged or invasion of IVC.
- Q112:** for early operable cases (stage 1 & 2) radical nephrectomy is the only hope for cure.
- Q114:**
- Commonest urological malignancy in Egypt, males 4:1 females. 55% TCC, 40% sq. cell carcinoma on top of long standing Bilharzial cystitis complicated by 2ry bacterial infection, 5% adenocarcinoma.
  - Tumor spreads directly infiltrates bladder wall then adjacent organs, seminal vesicles, prostate ... lymphatics only in 15%.
- Q116:** patient usually presents by recent exaggeration of cystitis symptoms, frequency, burning micturition.. recurrent attacks of painful haematuria
- Q119:** SCC: Occurs on top of long standing bilharzial cystitis complicated e` 2<sup>nd</sup> bacterial infection
- Tryptophan metabolism & N-nitroso compounds as nitrates are carcinogenic
  - B-glucuronidase enzyme convert non-carcinogenic substances to carcinogenic substances
  - Tobacco use and phenacetin abuse are risk factors of TCC
  - Squamous cell carcinoma of renal pelvis occurs on top of leukoplakia, it's often associated e` infection and calculus disease.
- Q121:**
- IVU reveal the presence of the lesion and assess renal function
  - cystoscopy & biopsy are mandatory
  - CT scan assess extent of lesion and any pelvic deposits
  - U/S Can Assess Kidney Size & Bladder Mass

- 8 -

# Orthopedic Radiology



## Upper Limb

### Fracture Clavicle



### Clavicle fracture

#### Questions (True or false)

1. This is the common site for this type of fracture ( )
2. The underlying cause is indirect trauma ( )
3. This fracture most commonly due to fall on outstretched hand. ( )
4. This fracture is commonly seen in old osteoporotic patient ( )
5. Malunion is the common complication for this fracture. ( )
6. Sudeck's atrophy is a possible complication ( )
7. Open reduction & internal fixation is the main line of treatment. ( )
8. Arm to neck sling is enough to reduce this fracture ( )

## Shoulder Dislocation



**Normal shoulder**



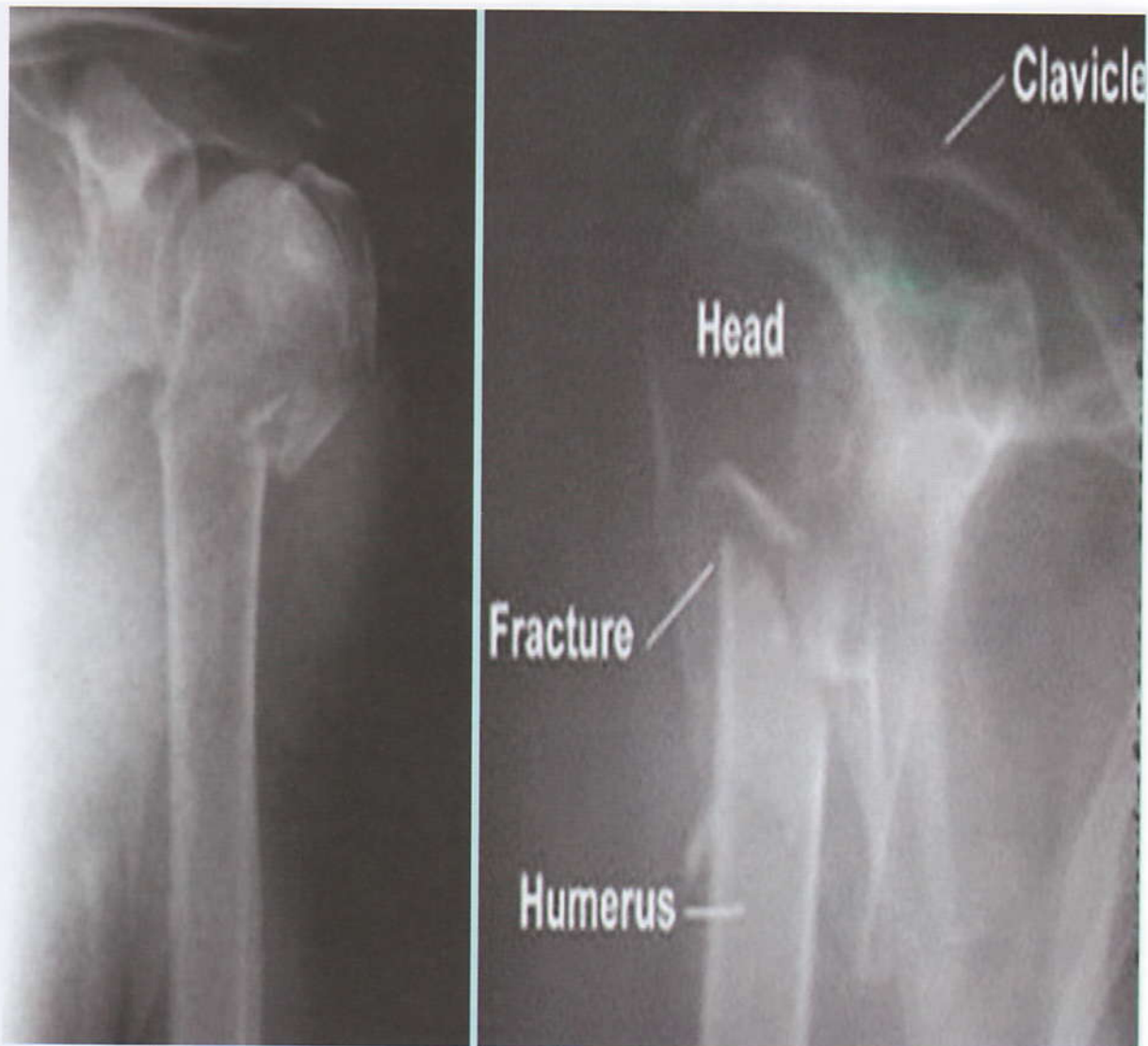
**Anterior shoulder dislocation**

### Questions (True or false)

9. This is the most common joint to be dislocated in the body. ( )
10. The head of the humerus is seen occupying a subglenoid position ( )
11. The underlying cause is direct impaction on the shoulder ( )
12. Patients usually present with locking of shoulder movements & loss of shoulder contour. ( )
13. Palpable bony crepitus is a sure clinical sign to diagnose ( )
14. Injury of the joint capsule is a famous complication ( )
15. Abduction deformity can be seen in this x-ray ( )
16. Closed reduction & fixation in adduction is the main line of treatment. ( )



## Fracture Humerus



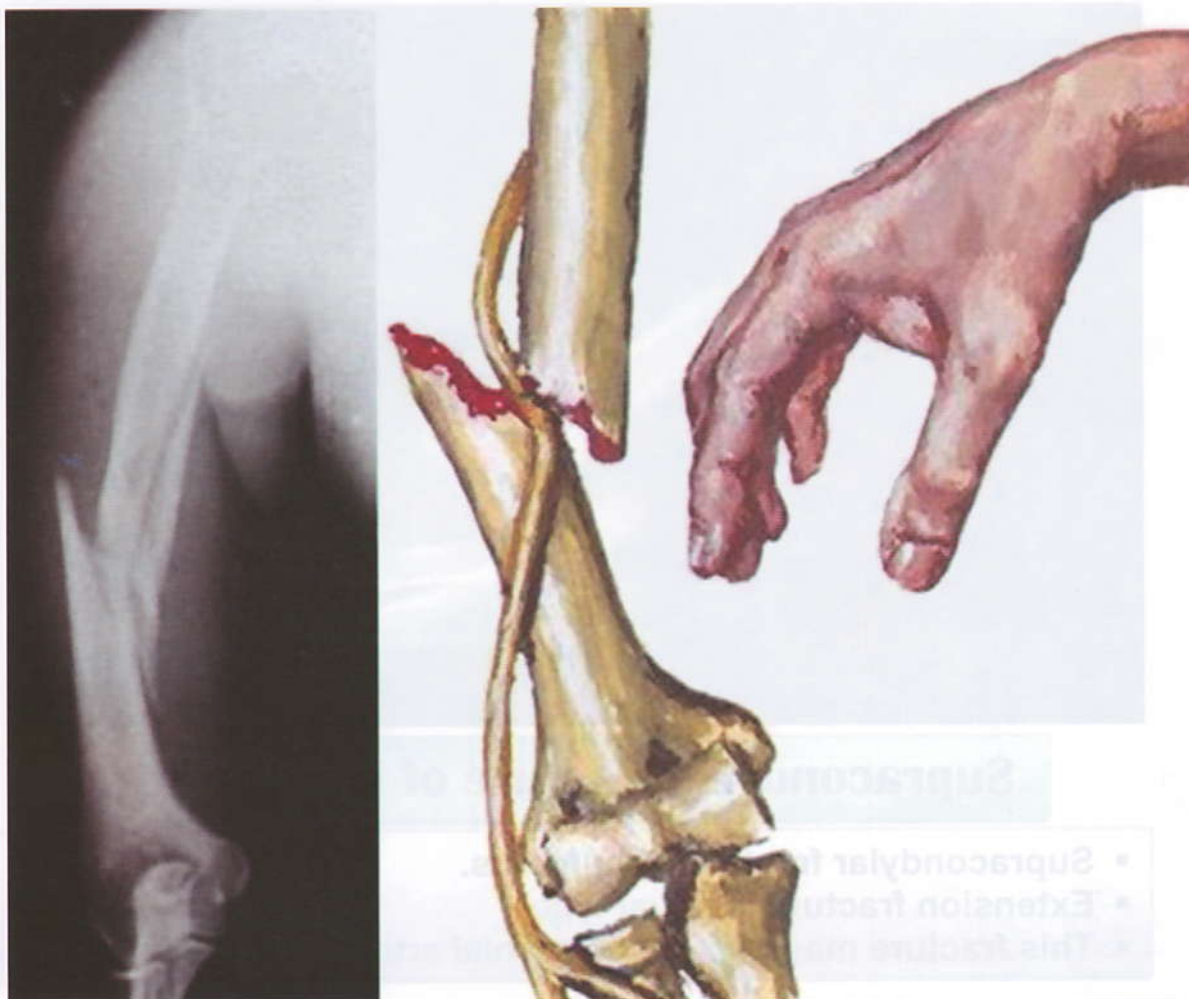
### Fracture of neck of humerus

- Fracture of neck of humerus.
- This fracture may injure the circumflex (axillary) nerve C5,6

### Questions (True or false)

17. Axillary nerve injury is a common complication ( )
18. A pathological fracture of the neck Humerus is the cause ( )
19. Flattening of shoulder contour may be a clinical feature ( )
20. Myositis Ossificans is a possible complication ( )
21. Closed reduction & external fixation is the treatment of choice. ( )

## Fracture Humerus



### Fracture of shaft of humerus

- Fracture of shaft of humerus.
- This fracture may injure the radial nerve while it lies in the spiral groove at the back of the bone

### Questions (True or false)

22. This is an avulsion fracture of the humerus ( )
23. This type of fracture is commonly a compound fracture ( )
24. Radial nerve injury is a possible complication ( )
25. Volkmann's contracture is a common complication ( )
26. The fracture seen is comminuted ( )
27. Angulation deformity and overriding can be seen in this x-ray ( )
28. Closed reduction + "U" shaped slap is a line of treatment ( )
29. Closed reduction & external fixation is the treatment of choice. ( )
30. Internal fixation is reserved for complicated cases only ( )



## Fracture Humerus



### Supracondylar fracture of humerus

- Supracondylar fracture of humerus.
- Extension fracture is usual type
- This fracture may injure the brachial artery or median nerve

### Questions (True or false)

31. This type of fractures is common in children. ( )
32. This type of fracture is a green stick fracture in 50% of cases ( )
33. This is the extension type ( )
34. This is the commonest type of this fracture ( )
35. It can be immobilized in extension ( )
36. This fracture can lead to a disturbance in the carrying angle of the forearm ( )
37. There is a disruption of the joint between the humoral condyles and olecranon process of the ulna in this x-r ( )
38. Vascular injury is a common complication with this fracture. ( )
39. Elbow stiffness can be a common complication ( )
40. It can produces cubitus varus deformity ( )
41. This condition can be associated with Volkmann's contracture ( )
42. It can be complicated by myositis ossificans ( )
43. Delayed ulnar neuritis can be a late complaint after healing ( )
44. Closed reduction & internal fixation is the treatment of choice. ( )

## Fracture Elbow



### Medial epicondyle fracture

- This fracture may injure the ulnar nerve



### Olecranon fracture



## Fracture Both Bones (Radius & Ulna)



### Fractures of radius and ulna

- Fractures of radius and ulna in a child.
- The ulna fracture is of the green-stick type

### Questions (True or false)

- |                                                                       |     |
|-----------------------------------------------------------------------|-----|
| 45. Cubitus Valgus is a common feature                                | ( ) |
| 46. Volkmann's contraction is a complication                          | ( ) |
| 47. Sudeck's atrophy is developed                                     | ( ) |
| 48. Cross union is a possible complication.                           | ( ) |
| 49. Vitamin D + calcium can be a line of treatment                    | ( ) |
| 50. Open reduction & internal fixation is the main line of treatment. | ( ) |

## Fractures of The Wrist



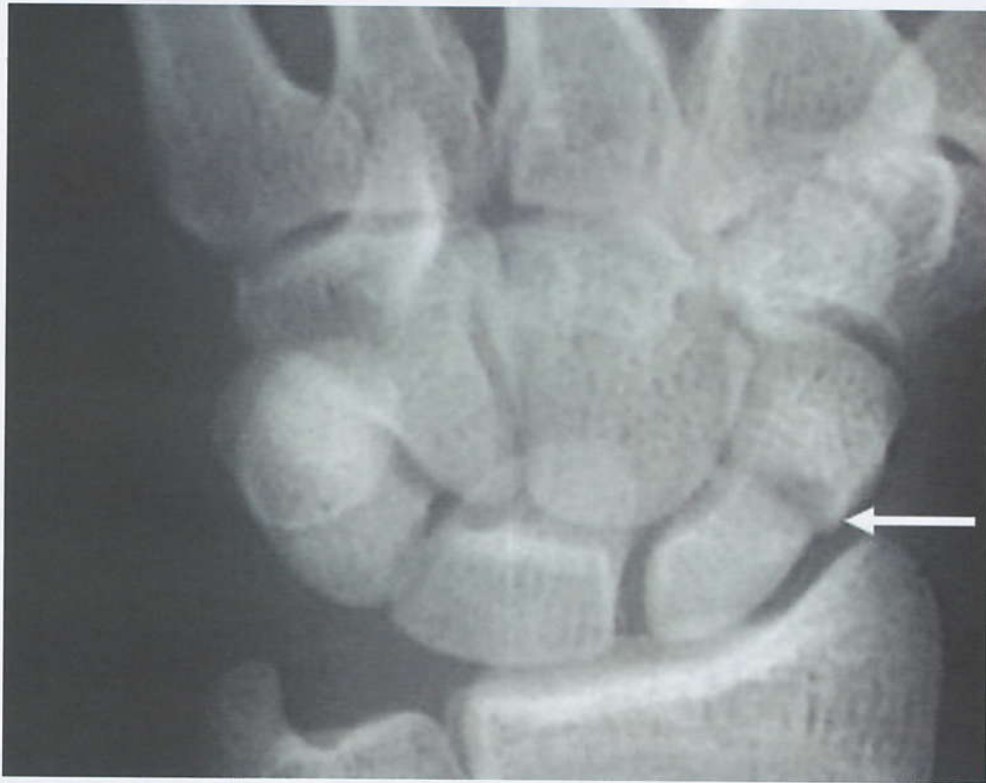
### Colles' fracture

#### Questions (True or false)

- |                                                                  |     |
|------------------------------------------------------------------|-----|
| 51. It is commonly seen in young adults                          | ( ) |
| 52. This fracture is common in osteoporotic patients.            | ( ) |
| 53. This type of fracture is commonly compound                   | ( ) |
| 54. Distal segment is displaced backwards, laterally & upwards.  | ( ) |
| 55. Sudeck's atrophy may complicate this condition.              | ( ) |
| 56. Malunion is a common complication                            | ( ) |
| 57. Cross union can be a complication                            | ( ) |
| 58. Volkmann's contraction is a complication                     | ( ) |
| 59. Impaction and lateral displacement can be seen in this x-ray | ( ) |
| 60. Internal fixation is the principle line of treatment         | ( ) |



## Fractures of The Wrist



**Scaphoid fracture**



**Fracture of 5<sup>th</sup> metacarpal**

# Lower Limb

## Fracture Pelvis



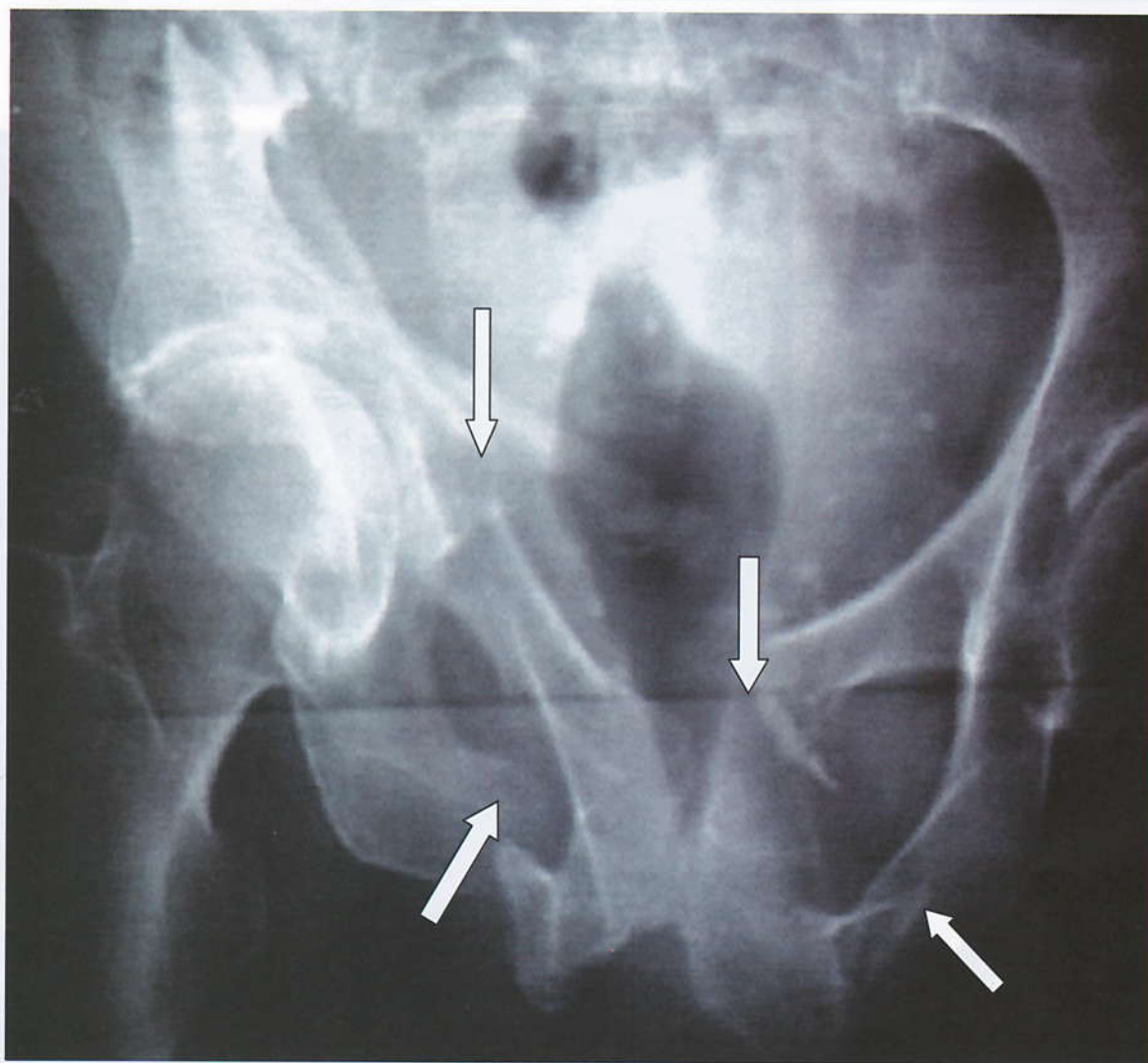
**Fracture of superior pubic ramus**

Questions (True or false)

61. The common cause is direct trauma
62. This is unstable fracture
63. Usually associated with marked blood loss
64. Intraoperative rupture bladder is a common complication
65. Malunion is a complication of this fracture
66. Stiffness of the hip joint can be a complication
67. Ileus is a common presentation
68. Immediate catheterization is indicated to detect urine outflow
69. The priority in management is directed toward correction of shock
70. Urgent surgical exploration may be needed for this patient
71. Internal fixation can be a line of treatment



## Fracture Pelvis



**Fracture of superior and inferior pubic ramus  
Butter fly fracture**

### Questions (True or false)

- |                                                                       |     |
|-----------------------------------------------------------------------|-----|
| 61. The common cause is direct trauma                                 | ( ) |
| 62. This is unstable fracture                                         | ( ) |
| 63. Usually associated with marked blood loss                         | ( ) |
| 64. Intraperitoneal rupture bladder is a common complication          | ( ) |
| 65. Malunion is a complication of this fracture                       | ( ) |
| 66. Stiffness of the hip joint can be a complication                  | ( ) |
| 67. Ileus is a common presentation                                    | ( ) |
| 68. Immediate catheterization is indicated to detect urine outflow    | ( ) |
| 69. The priority in management is directed toward correction of shock | ( ) |
| 70. Urgent surgical exploration may be needed for this patient        | ( ) |
| 71. Internal fixation can be a line of treatment                      | ( ) |

## Fracture Pelvis



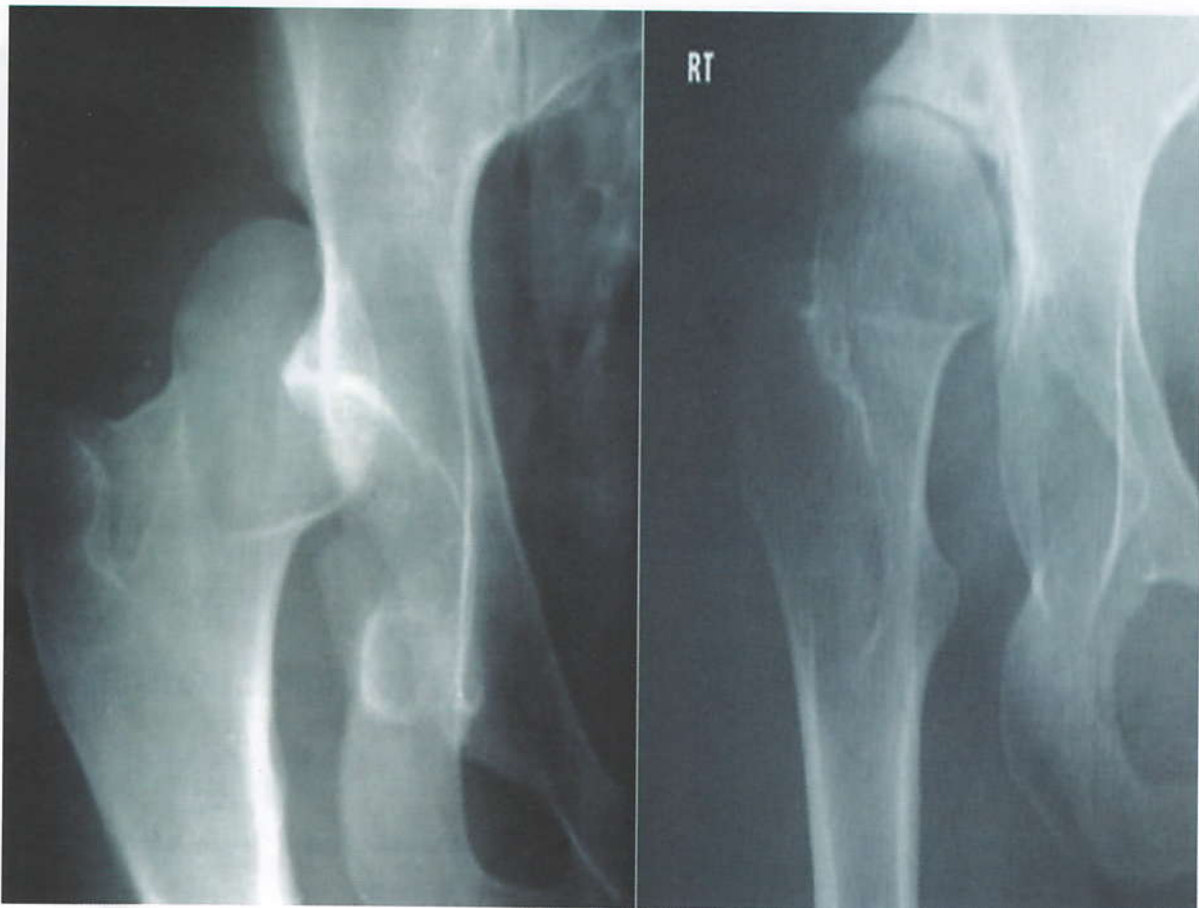
### Open-book fracture of pelvis

#### Questions (True or false)

72. Road traffic accidents is a major underlying cause ( )
73. This fracture is common in osteoporotic patients. ( )
74. This is stable fracture ( )
75. It is commonly compound and comminuted ( )
76. A double level fracture can be seen ( )
77. Rupture bladder & rupture urethra must be excluded ( )
78. Severe blood loss is a common complication. ( )
79. Open reduction & internal fixation is the main line of treatment. ( )
80. External fixation in a plaster cast in the main line of treatment ( )



## Hip Dislocation



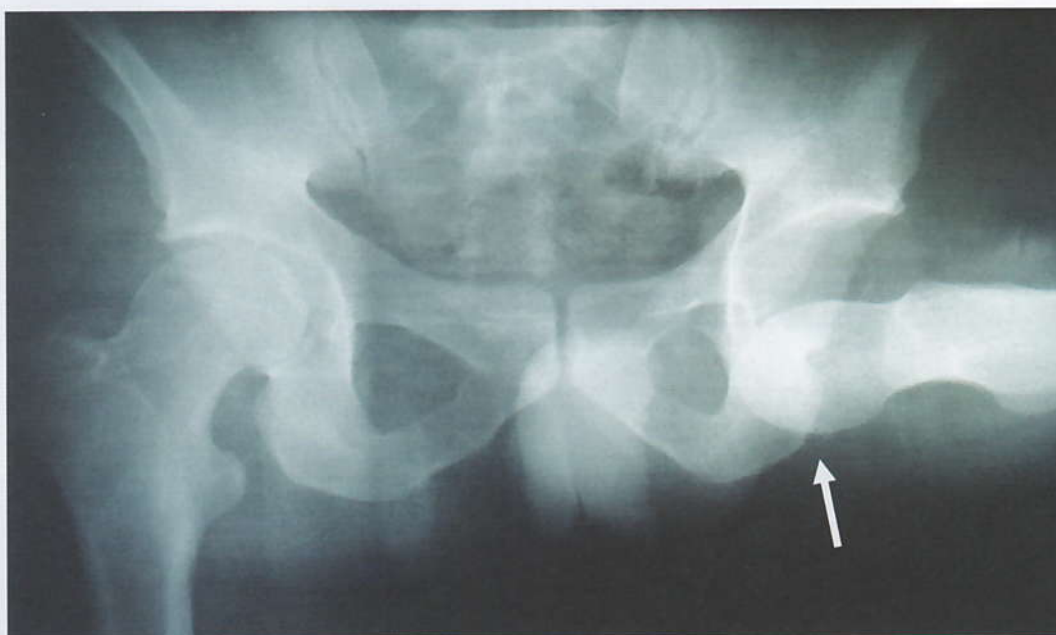
### Posterior hip dislocation

- This is the most frequent variety of hip dislocation

#### Questions (True or false)

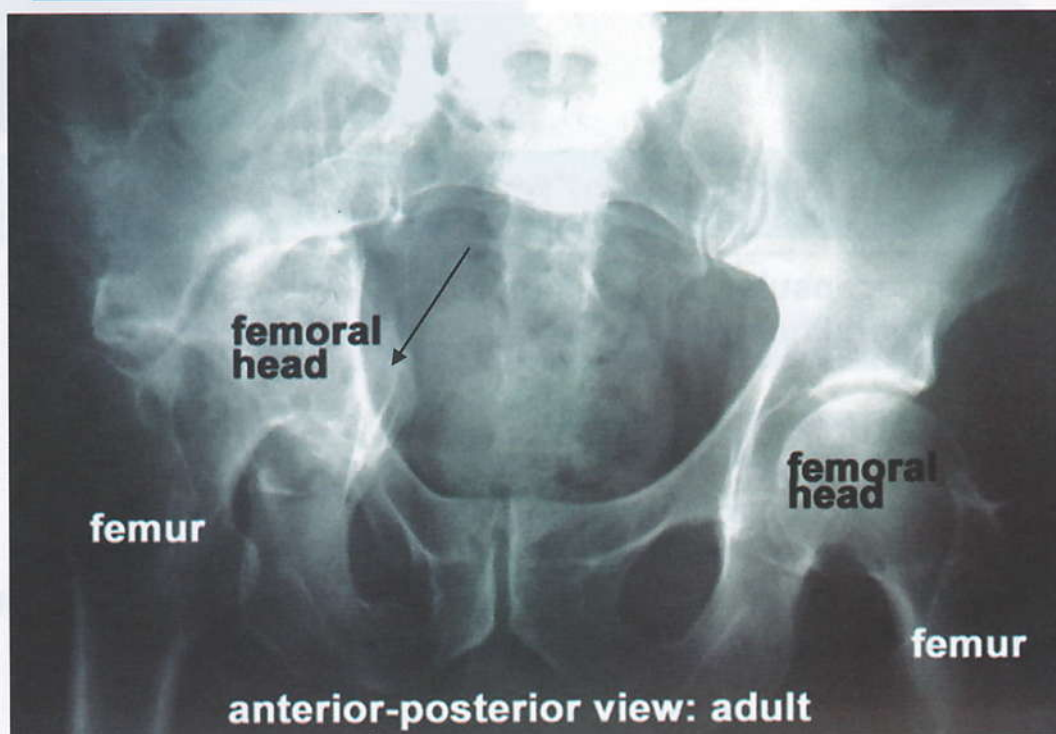
81. This is the most common type of hip dislocation. ( )
82. Patients usually present with flexed, adducted & internally rotated hip ( )
83. This patient presents with locking joint ( )
84. Palpable bony crepitus is a sure clinical sign to diagnose ( )
85. Sciatic nerve injury is a common complication. ( )
86. Injury of the joint capsule is a famous complication ( )
87. Abduction deformity can be seen in this x-ray ( )
88. Closed reduction + Hip Spica is the best treatment ( )

## Hip Dislocation



### Anterior hip dislocation

- These are less frequent varieties of hip dislocation

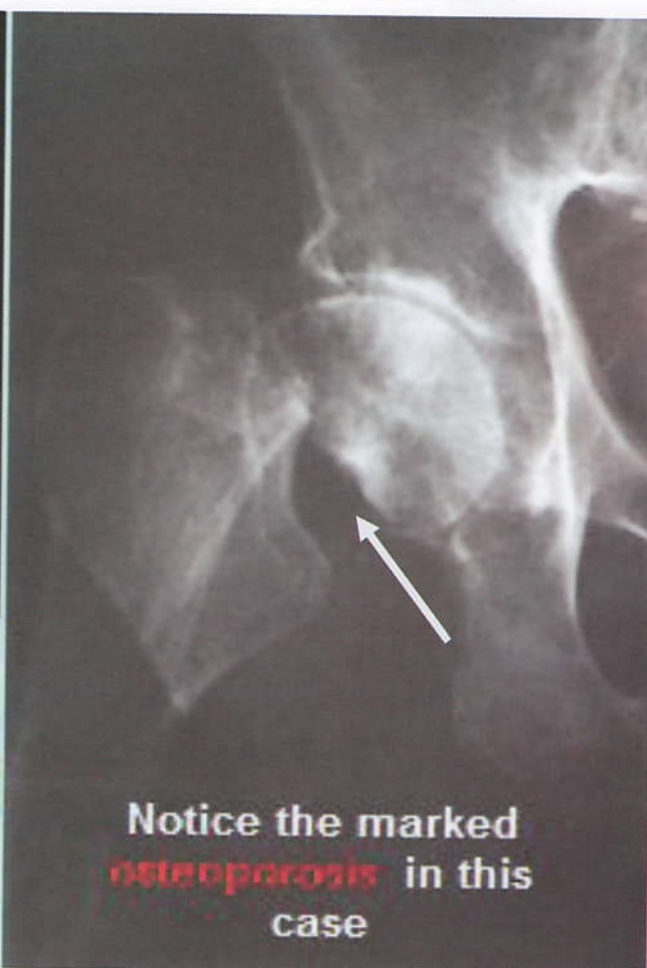
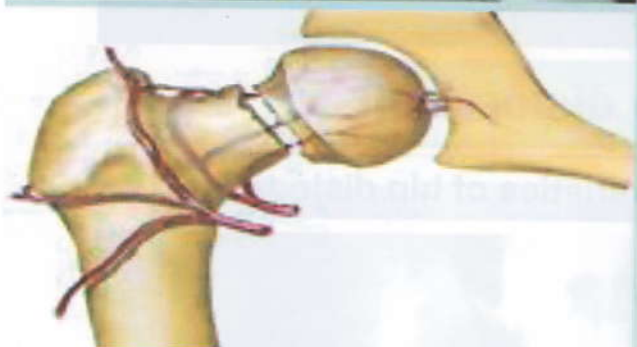


### Central hip dislocation

- These are less rare variety of hip dislocation



## Fracture Femur



### Fractures of neck of femur(Intra-capsular type)

- Intracapsular fractures may cause necrosis of femoral head if they are markedly displaced

### Questions (True or false)

89. This fracture is common in young age. ( )
90. This fracture carries a mortality of about 20%. ( )
91. A vascular necrosis of femoral head is a common complication ( )
92. Coxa Vera is a possible complication of this fracture ( )
93. Early surgical treatment is recommended for this fracture. ( )
94. Hemi-arthroplasty is indicated ( )



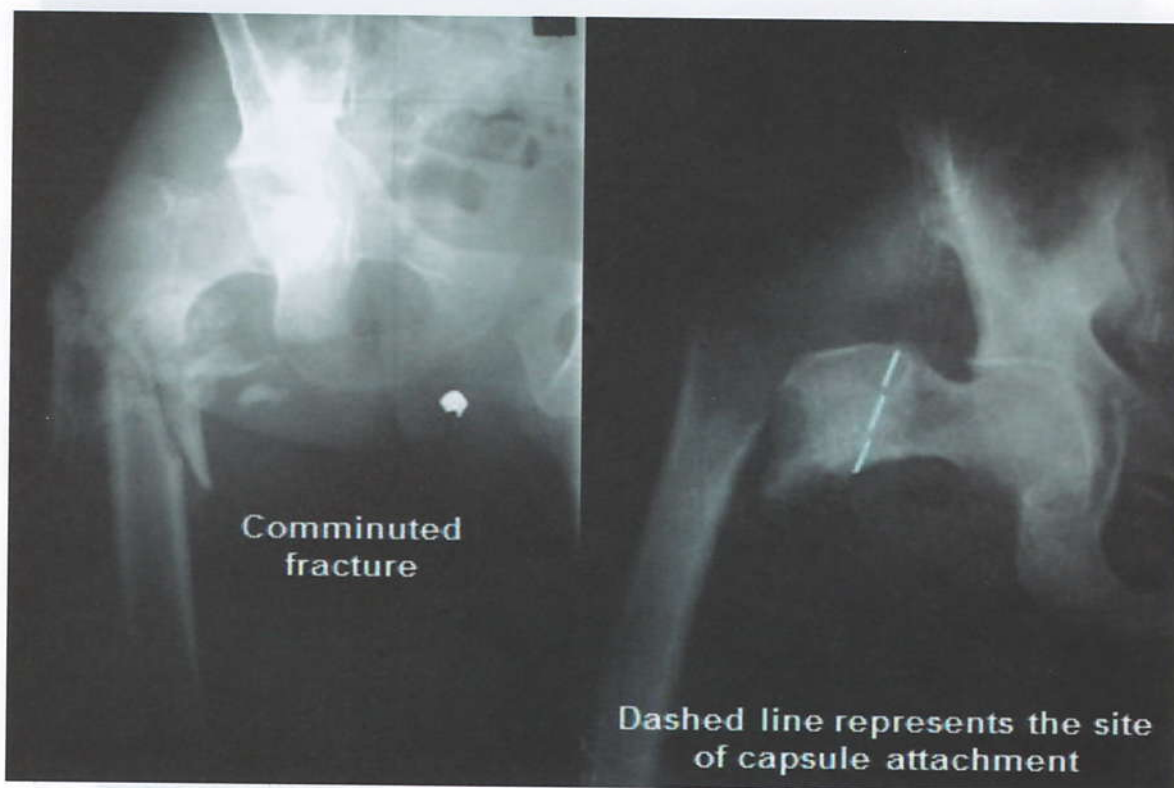
**Necrosis of femoral head is treated by hemiarthroplasty (Austin - Moore)**

### Questions (True or false)

- 95. This is a dynamic hip screw ( )
- 96. This patient was suffering from fracture neck femur ( )
- 97. This procedure is indicated for a vascular necrosis head femur ( )
- 98. This is indicated in inter-trochanteric fracture neck femur ( )
- 99. Hip joint stiffness is a possible complication of this procedure ( )



## Fracture Femur



### Fractures of neck of femur(Extra-capsular type)

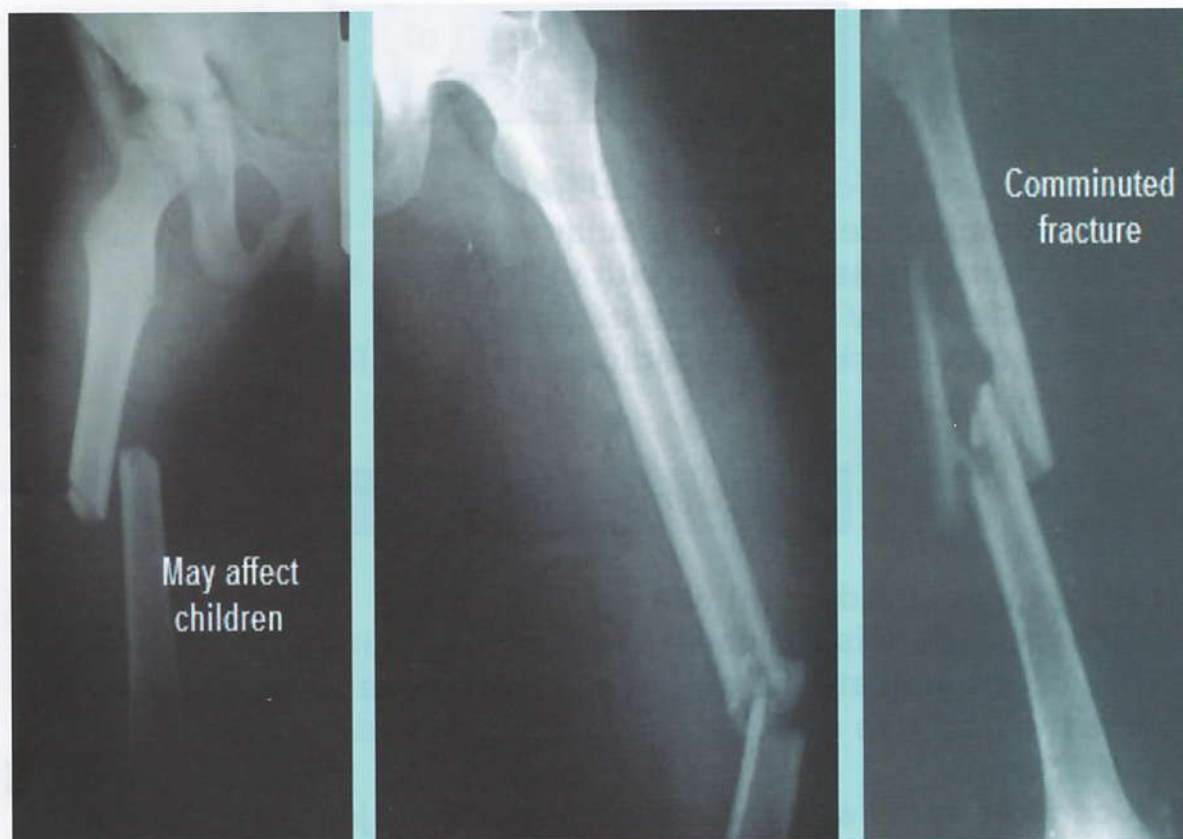


### Dynamic hip screw

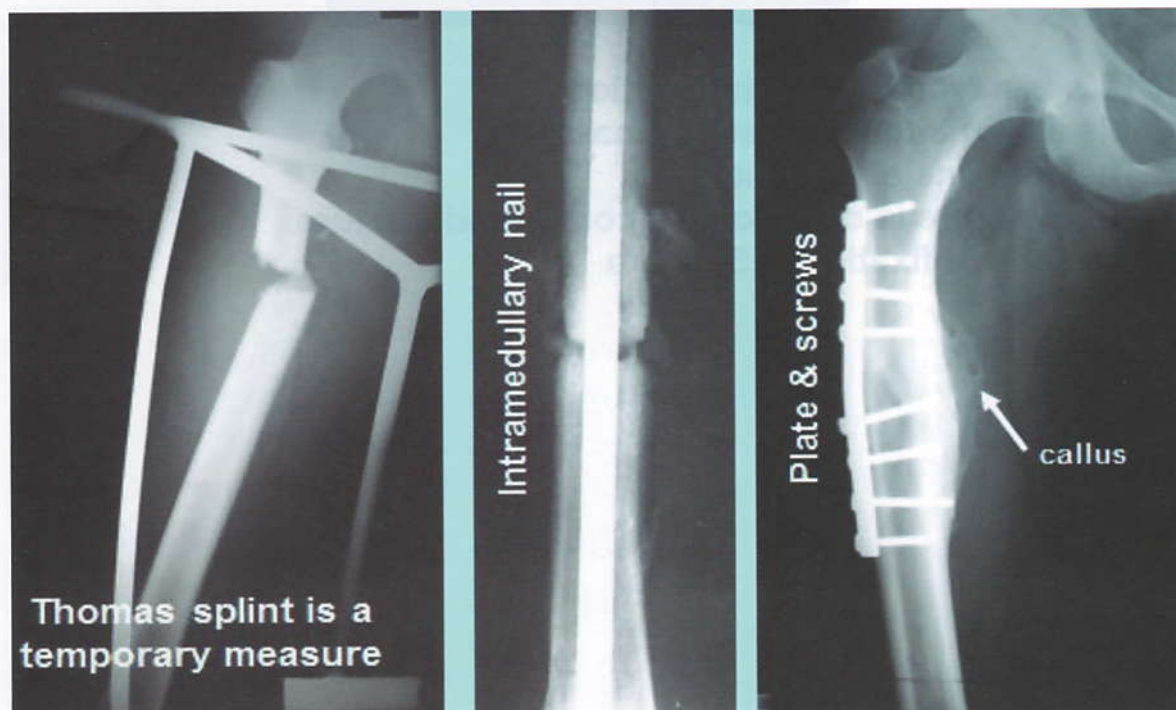
#### Questions (True or false)

100. Avascular necrosis of head of femur is a complication. ( )  
 101. This is a common site for pathological fractures. ( )  
 102. ORIF is the best line of treatment of this fracture ( )

# Fracture Femur



## Fractures of shaft of femur



## Treatment of Fracture shaft of femur



**Questions (True or false)****Fractures of shaft of femur**

103. This underlying cause is a mild trauma ( )  
 104. It can complicate with avascular necrosis ( )  
 105. It is commonly associated with major blood loss ( )  
 106. This patient may suffer from oliguria ( )  
 107. Associated arterial injury indicates internal fixation of the fracture ( )

**Intramedullary nail**

108. This is a post reduction film ( )  
 109. This procedure is indicated in open compound fracture femur ( )  
 110. It is contraindicated in children with fracture shaft femur ( )  
 111. It is the best line of treatment in simple transverse fracture shaft femur ( )  
 112. It can interfere with the movement of knee joint if not properly placed ( )

**Thomas splint**

113. This is a type of skeletal traction ( )  
 114. It is a skin traction over Thomas ( )  
 115. The best line of treatment ( )  
 116. This fracture is commonly a compound fracture ( )  
 117. The time of fixation is 3 weeks ( )

## Fracture Femur

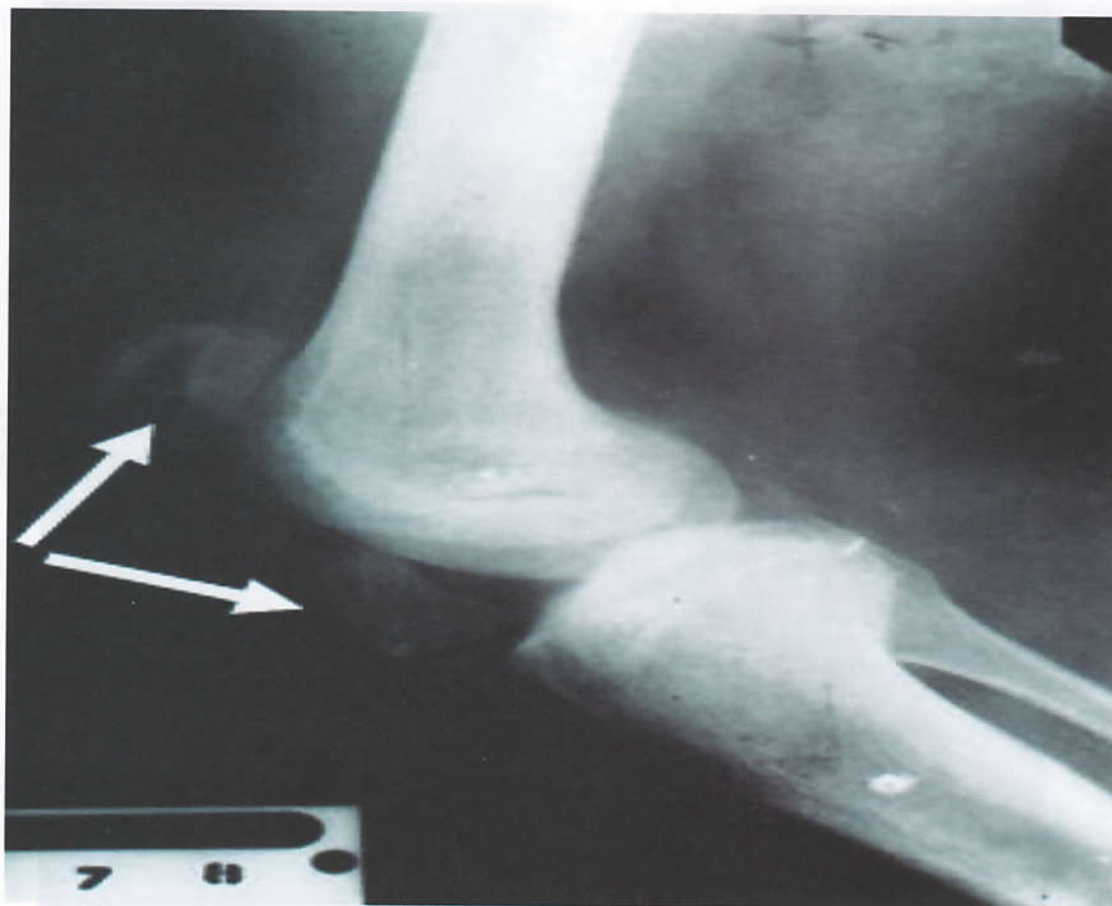


### Supracondylar fracture of femur

- This fracture may injure the popliteal artery



## Fracture Patella



### Fracture Patella

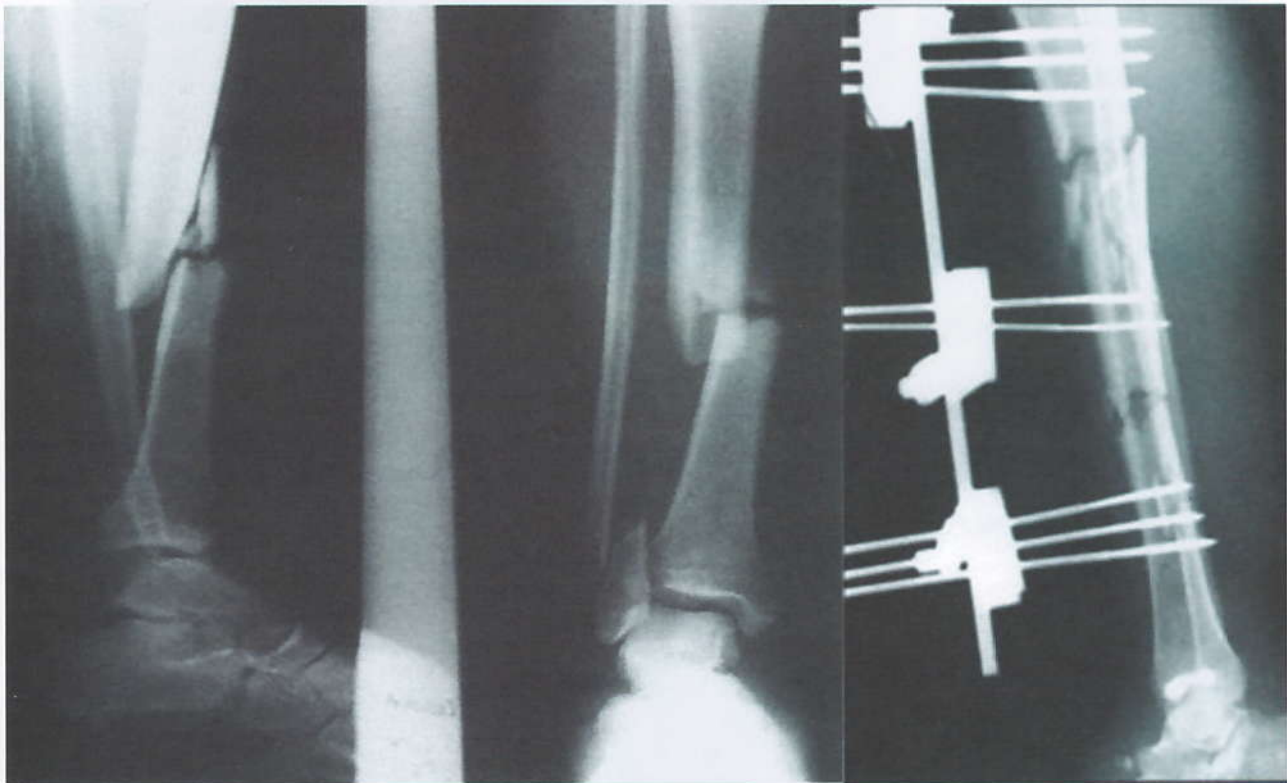
- Fracture of patella with wide separation of bone

### Questions (True or false)

- 118. This fracture is unstable
- 119. The patient presents with distal ischemia
- 120. Associated Patellar fluctuation
- 121. Haemarthrosis is a complication
- 122. Total Patellectomy may be indicated

( )  
( )  
( )  
( )  
( )

## Fracture Both Bones (Tibia & Fibula)



**Fracture of tibia and fibula**

**External metal fixation**

- Fracture of tibia and fibula commonly compound
- External metal fixation is suitable for compound fractures of tibia

### Questions (True or false)

#### Fracture of tibia and fibula

123. This fracture is commonly a compound fracture. ( )
124. Cross union is a possible complication. ( )
125. Open fracture should be treated with internal fixation. ( )
126. This is an unstable fracture ( )
127. It may leads to ankle stiffness ( )
128. Above knee plaster cast can be a line of treatment ( )

#### External metal fixation

129. This is a comminuted fracture ( )
130. This x. ray show evidence of healing ( )
131. This x. ray show evidence of bone impaction ( )
132. It may be complicated by Avascular necrosis ( )
133. This procedure allows early mobilization ( )



## Ankle fractures



### Ankle fractures

#### Questions (True or false)

134. This is a third degree ankle fracture dislocation ( )
135. 3rd degree fracture should be treated by ORIF. ( )
136. 1st degree fracture can be treated by below knee plaster cast. ( )
137. Ankle stiffness is a common complication ( )
138. Sudeck's atrophy is a possible complication ( )
139. Below knee plaster cast can be a line of treatment for this patient ( )
140. Internal fixation is the best line of treatment for this patient ( )

## Bone Inflammation



### Chronic non-specific osteomyelitis

- Chronic non-specific osteomyelitis is also a common occurrence with diabetic foot infections, particularly with deep neuropathic ulcers
- Remember that acute osteomyelitis does not produce radiological change

### Questions (True or false)

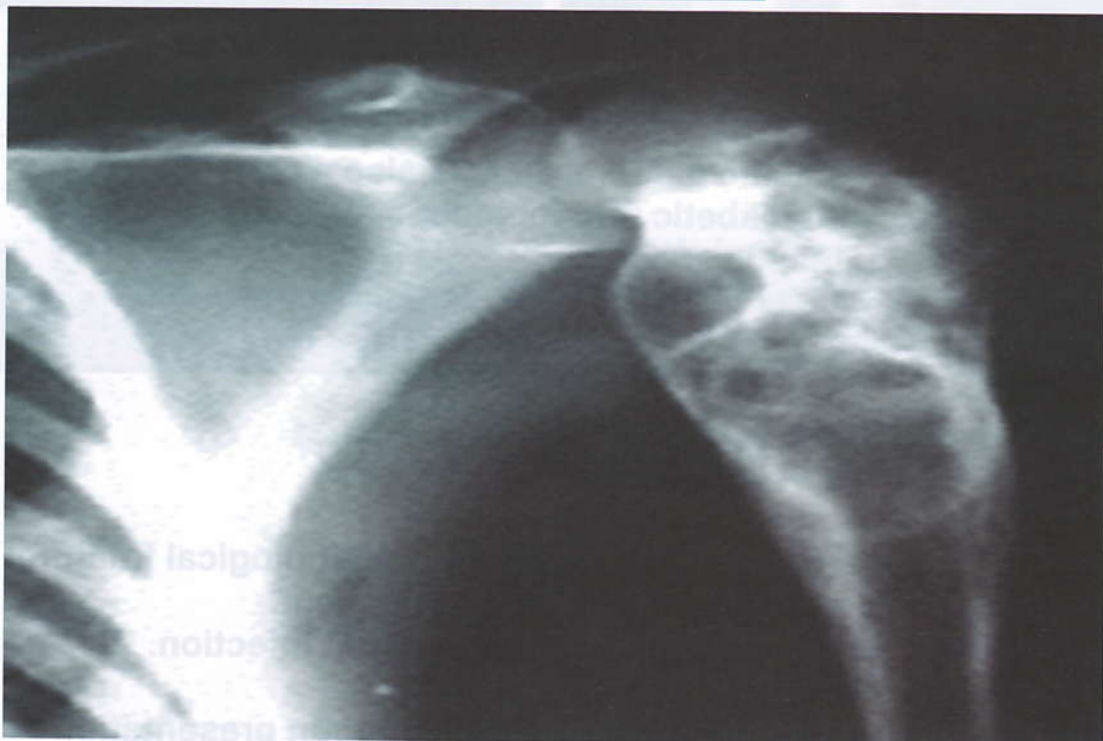
141. This disease is common in children. ( )
142. This condition may be complicated with pathological fracture. ( )
143. Surgical treatment is the best line of treatment. ( )
144. This condition is common with diabetic foot infection. ( )
145. Sequestrum is seen in this x-ray ( )
146. Limitation of movements of joint is a common presentation ( )
147. Ewing sarcoma is a differential diagnosis ( )
148. Sequestrectomy + Saucerization is the best treatment ( )



## Bone Tumours



**Simple bone cyst**



**Multilocular bone cyst of humerus**

## Bone Tumours



### Chondroma

- Radiolucent lesions of phalanges that expand bone from inside Enchondroma.
- They may be multiple and may cause pathological fracture

### Questions (True or false)

- |                                                               |     |
|---------------------------------------------------------------|-----|
| 149. Enchondroma expand bone from inside.                     | ( ) |
| 150. Chondroma may be complicated with pathological fracture. | ( ) |
| 151. The lesion is traumatic                                  | ( ) |
| 152. It affects short long bone                               | ( ) |
| 153. Patient presents by Toxemia                              | ( ) |
| 154. Associated with Egg shell crackling sensation            | ( ) |
| 155. Curettage & bone graft is the treatment of choice        | ( ) |



## Bone Tumours



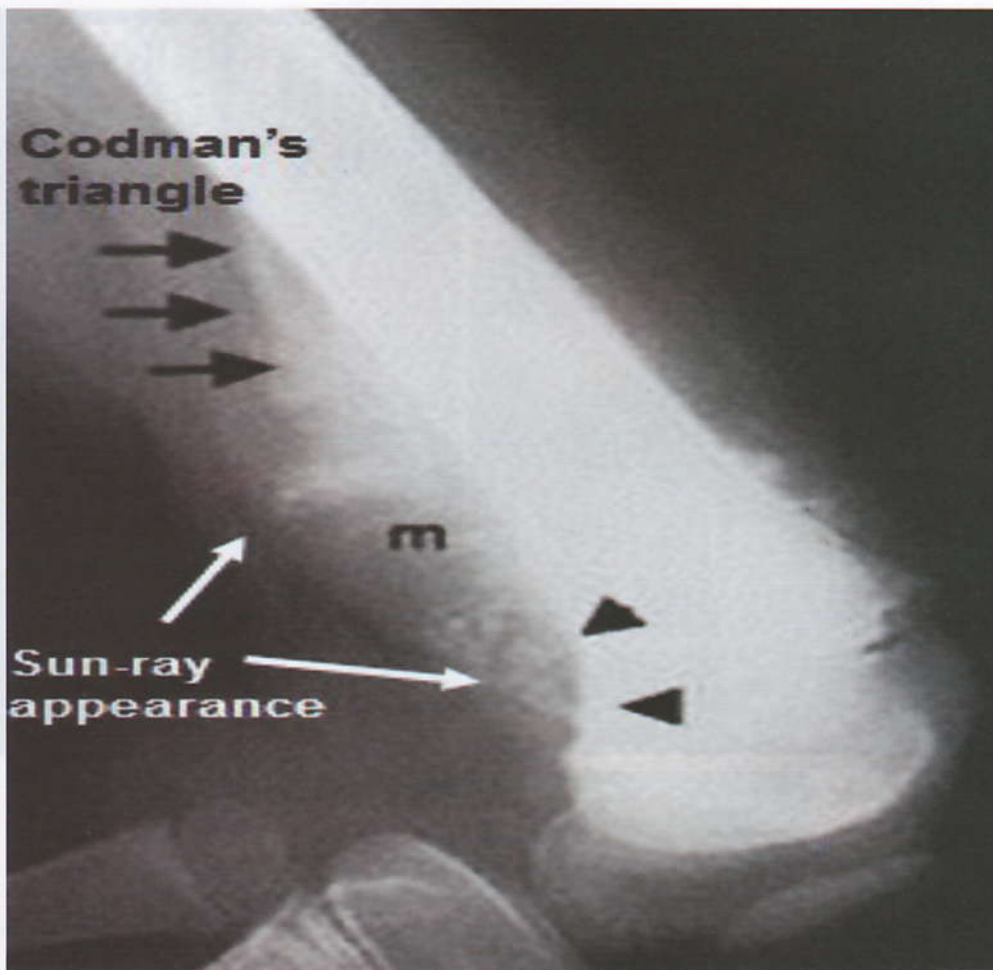
### Osteochondroma (exostosis)

- Osteochondroma (exostosis) at its typical position the metaphysis of the lower femur

### Questions (True or false)

156. Clinical examination reveals a mass bigger than seen in x-ray. ( )
157. This lesion can lead to limitation of movement of adjacent joint. ( )
158. The site of the lesion is epiphyseal ( )
159. There is a bone expanding lesion seen in this x-ray ( )
160. This lesion can turn malignant ( )
161. It can leads to limitation of movements in the knee joint ( )
162. Radiotherapy is the treatment of choice in advanced cases ( )

## Bone Tumours



### Osteosarcoma

- Commonest 1ry bone malignancy
- Children (rarely elderly on top of Paget's disease)
- Growing end of bones (commonest site is lower femur)
- Metaphyseal
- Bone destruction & new bone formation (see X-ray)
- Invasion of local soft tissues
- Blood spread to lungs

### Questions (True or false)

163. This tumor usually occurs in young age. ( )
164. It is a locally malignant tumor. ( )
165. The origin of the lesion is metaphyseal ( )
166. Codman's triangle is composed of lifted periosteum due to new bone formation. ( )
167. Surgical treatment is the best line of treatment. ( )



## Bone Tumours



**Giant-cell tumor  
Osteoclastoma**

- Varying grades of malignancy
- Growing end of bones
- Epiphyseal
- Bone destruction NO new bone formation (see X-ray)
- Good demarcation between tumor and bone medulla
- No invasion of articular cartilage

### Questions (True or false)

168. This is a locally malignant tumor. ( )
169. Recurrence is a common complication after treatment. ( )
170. DD of this condition includes acute osteomyelitis. ( )
171. This condition is commonly seen in children ( )
172. A medullary plug can be seen in this x-ray ( )
173. Recurrence after treatment is a famous complication ( )
174. MRI may help in the diagnosis ( )
175. Radiotherapy is the best line of treatment ( )

## Bone Tumours



### Chondrosarcoma

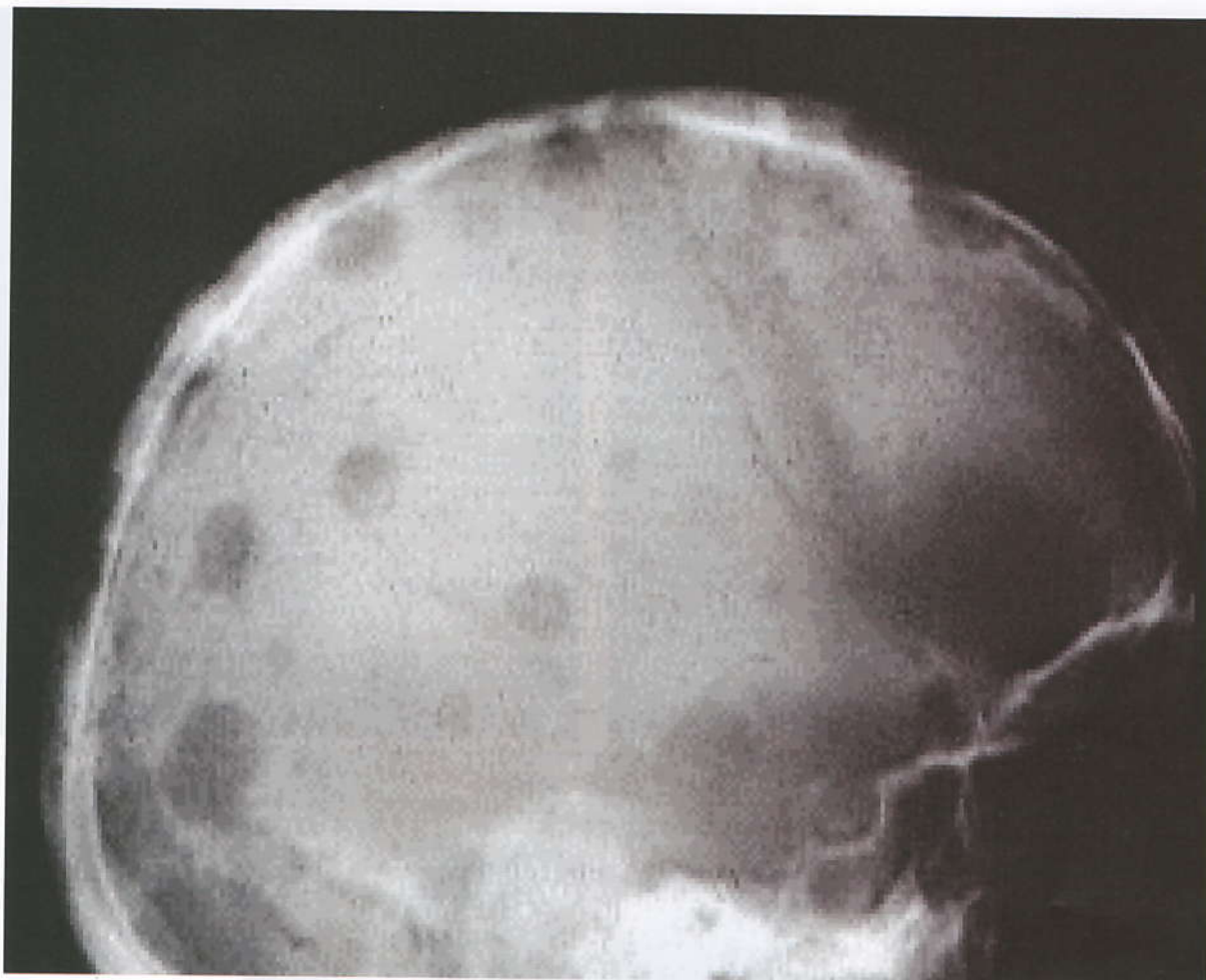
- affects flat bones as the ilium and shows characteristic flecks of calcification

#### Questions (True or false)

176. The characteristic radiological sign is fluffy cotton appearance ( )
177. This condition is commonly seen among flat bones ( )
178. Radiotherapy is the best line of treatment ( )
179. Wide local resection is treatment of choice in advanced cases ( )
180. Hemi-arthroplasty is the best surgical treatment ( )



## Bone Tumours



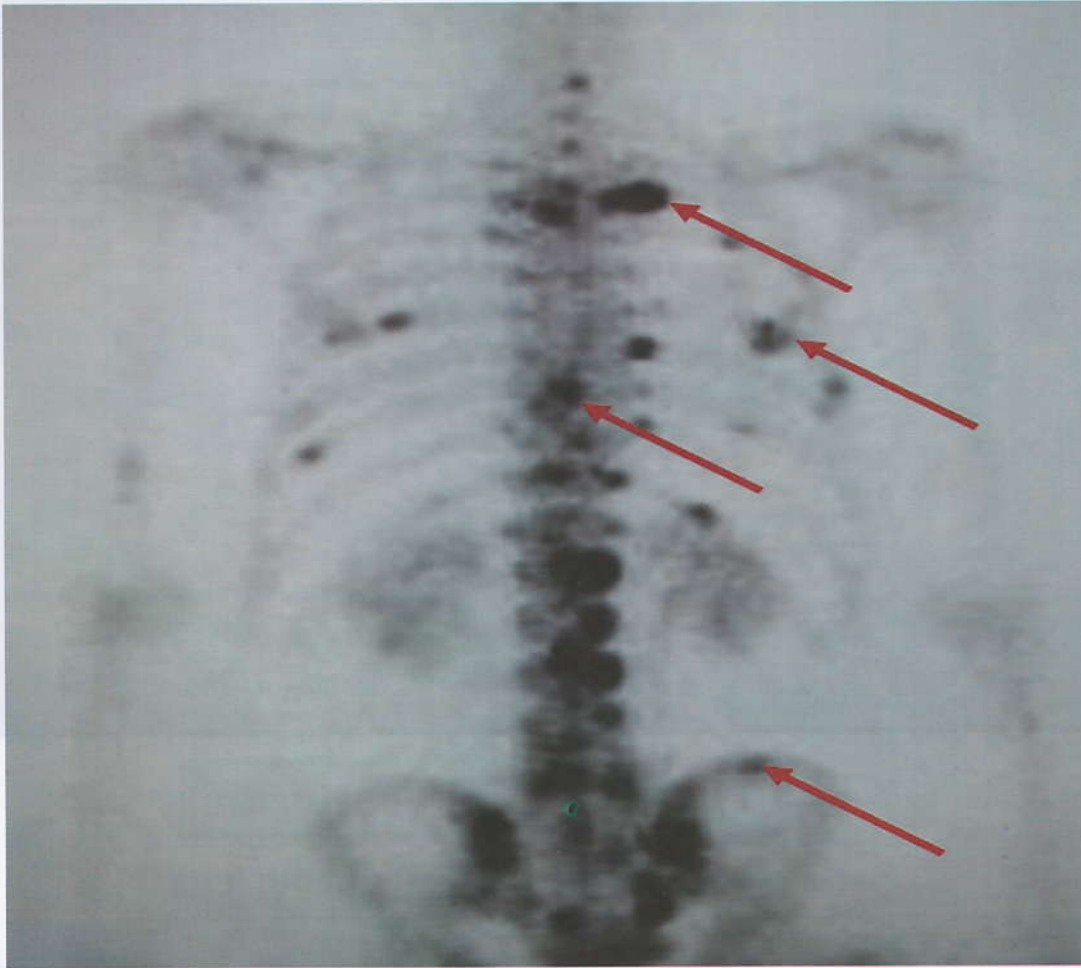
### Multiple osteolytic lesions

- Multiple osteolytic lesions that affect the skull
- Metastases or multiple myeloma

### Questions (True or false)

181. Differential diagnosis of this condition includes multiple myeloma & bone metastasis. ( )
182. They should be differentiated from each other by bone scan. ( )
183. Bone metastasis is the commonest bone malignancy. ( )
184. Pathological fracture of the right iliac bone is seen in this x-ray ( )
185. Cancer prostate is a common underlying cause ( )
186. Low back pain is a common clinical presentation ( )
187. Radiotherapy can be a line of treatment ( )

## Bone Tumours



### Multiple bone metastases

- Bone isotope scan showing
- Multiple bone metastases that appear as dark spots
- Bone metastases are the commonest bone malignancies

### Questions (True or false)

- |                                                      |     |
|------------------------------------------------------|-----|
| 188. The Radio isotope used is technichum 99         | ( ) |
| 189. Pathological fracture is a common complication  | ( ) |
| 190. Alkaline phosphates enzyme is commonly raised   | ( ) |
| 191. Surgical excision is the best treatment         | ( ) |
| 192. The prognosis of this condition is usually good | ( ) |



## Other bone diseases



### Bilateral hip osteoarthritis

- Obliterated joint spaces of both hips



### Bilateral Congenital Hip Dislocation (CDH)

## Other bone diseases



### Hyperparathyroidism

- Hyperparathyroidism may produce multiple bone cysts

### Questions (True or false)

- |                                                       |     |
|-------------------------------------------------------|-----|
| 193. This lesion could be Ostitis fibrosa cystica     | ( ) |
| 194. Hypocalcaemia is a common finding                | ( ) |
| 195. Urinary calculi is a common complication         | ( ) |
| 196. C.T neck can be a useful investigation           | ( ) |
| 197. Vitamin D and calcium can be a line of treatment | ( ) |



# Orthopedic Key answer

|    |       |
|----|-------|
| 1  | True  |
| 2  | True  |
| 3  | True  |
| 4  | FALSE |
| 5  | True  |
| 6  | FALSE |
| 7  | FALSE |
| 8  | True  |
| 9  | True  |
| 10 | FALSE |
| 11 | FALSE |
| 12 | True  |
| 13 | FALSE |
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| 15 | True  |
| 16 | True  |
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| 18 | FALSE |
| 19 | True  |
| 20 | FALSE |
| 21 | FALSE |
| 22 | FALSE |
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| 24 | True  |
| 25 | FALSE |
| 26 | FALSE |
| 27 | True  |
| 28 | True  |
| 29 | FALSE |
| 30 | True  |
| 31 | True  |

|    |       |
|----|-------|
| 32 | True  |
| 33 | True  |
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| 37 | FALSE |
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| 39 | True  |
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| 50 | True  |
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| 53 | FALSE |
| 54 | True  |
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| 92 | True  |
| 93 | True  |



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| 94  | True  |
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| 101 | True  |
| 102 | True  |
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| 114 | True  |
| 115 | True  |
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| 122 | True  |
| 123 | True  |
| 124 | True  |

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| 125 | FALSE |
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| 175 | FALSE |
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| 178 | FALSE |
| 179 | True  |
| 180 | FALSE |
| 181 | True  |
| 182 | True  |
| 183 | True  |
| 184 | FALSE |
| 185 | True  |
| 186 | True  |

|     |       |
|-----|-------|
| 187 | True  |
| 188 | True  |
| 189 | True  |
| 190 | True  |
| 191 | FALSE |
| 192 | FALSE |
| 193 | True  |
| 194 | FALSE |
| 195 | True  |
| 196 | True  |
| 197 | FALSE |



## Important Points & Tweets based on our Questions

- Q1:** Fracture middle third of clavicle is the commonest fracture in the whole body .
- Q3:** usually due to fall on outstretched hand , usually in the middle 1/3.
- Q4:** commonly in children, of greenstick variety.
- Q5:** Malunion is common but of no significant cosmetic problem
- Q8:** broad arm sling for 3 weeks & analgesics is the Ttt.
- Q9:** commonest dislocation in the body, commonly anterior dislocation , common to be subcoracoid
- Q11:** usually due to forced extension & external rotation of abducted arm.
- Q14:** Recurrence is a common problem due to detachment of labrum glenoidal & anterior capsule from anterior margin of the glenoid
- Clinical redislocation occurs at ease → reduction becomes more easy.
- Q17:** Common complications: • Shoulder stiffness • Axillary nerve injury .
- Q18:** Fracture proximal humerus is common in elderly with osteoporosis.
- Q21:** About 80% of fractures of proximal humerus are undisplaced & fractured parts are stabilized by intact rotator cuff muscles .. simply ttt by external immobilization by a sling .
- Q23:** Fracture shaft humerus common to be by indirect trauma , fall on outstretched hand or twisting .
- Q24:** Radial N. injury is commonest complication , delayed union , non union & joint splint
- Q28:** closed reduction & bandage by U-shaped plaster slab from top of acromion till below elbow for 8 weeks.
- Q31:**
- Supracondylar fracture most common in children due to fall on outstretched hand
  - In most of cases(99%) it is of extension type
  - It is green stick in 50% of cases
- Q36:** the relation between the 2 epicondyles & olecranon , normally the 3 points are on same line in extension & form an equidistant triangle in flexion, this relation maintained in supracondylar fracture, but disturbed in elbow dislocation.
- Q38:** Brachial artery injury that may lead to gangrene or Volkmann's ischemic contracture , fasciotomy is needed to relieve acute compartmental syndrome.
- Q40:** delayed union , joint stiffness Myositis ossificans , malunion .. can happen .
- Q43:** Injury of median, ulnar, or radial nerve can happen usually neurapraxia



- Q44:** for undisplaced fractures , & greenstick type → only fix by posterior plaster slab & collar & cuff , with elbow fixed for 3 weeks.
- Greenstick type with angulation > 20% → reduction by flexion only then fix as above.
  - Displaced fractures → closed reduction & fix. By posterior slab under anesthesia.
- Q46:** Acute compartmental syndrome could happen , do fasciotomy.
- Q48:** cross union bet, radius & ulna → synostosis.
- Q51:** This is fracture of distal end of radius due to fall on the palm of outstretched hand , common below age of 50
- After this age it increases in women , due to postmenopausal osteoporosis.
- Q54:** distal fragment shows: dorsal displacement & tilt , radial displacement upward displacement & impaction , & supination
- The fracture is often comminuted.
- Q56:** Malunion can happen, while union is the rule , there is some residual deformity due to redisplacement that may occur inside the cast ) ( A Colles' plaster does not control the supination element of the deformity .
- Q57:** other complications( carpal tunnel syndrome/ stiffness of the wrist joint/ rupture of extensor pollicis longus tendon).
- Q60:** Reduction under anesthesia as if "shaking hands", then fix by a below elbow plaster cast
- Circulation of fingers watched carefully in the next 24 hours
  - Cast left for 6 weeks.
- Q61:** Either direct anteroposterior or lateral compression form a crushing injury , or indirect compression through lower limb.
- Q62:** Double fractures of pelvic ring causes variable stability , in vertical shear fracture the mobile hemipelvis tend to be pulled upward by anterior & posterior trunk muscles , associated with highest morbidity & mortality
- In hinge subluxation type , disrupted symphysis pubis & and one of sacroiliac joints → open book fracture.
- Q63:** there is usually shock , with marked blood loss up to 2-5 liters .
- Q64:** Extra peritoneal rupture of UB.
- Q65:** Malunion can happen , although cause no significant problems . except in females ( cesarean section can be needed for delivery) .
- Q67:** Paralytic ileus due to retroperitoneal haematoma .
- Q68:** avoided to avoid more urethral injury if present , exclude 1<sup>st</sup> by absence of blood on tip of penis & by sonar.
- Q70:** TTT of shock & polytrauma pt 1<sup>st</sup> the , for the fracture ( if vertical shear → reduction by skeletal traction to the leg & pelvic sling, traction maintained for 12 week)( or , OR & IF).
- Q73:** Fractures of pelvis result usually from road traffic accident in person < 60 years old & fall at home in the elderly .



- Q77:** pelvic fractures , complicated by ( shock)( visceral injury , UB, rectum, urethra , BL VSs & nerves) ( paralytic ileus) (DVT)( malunion).
- Q81:** Hip joint is stable due to depth of acetabular cavity and strength of the muscles & ligaments , so less common than shoulder dislocation & by far Posterior dislocation is the commonest type instead of anterior or central dislocation .
- Q82:** Severe pain , Deformity ( hip in position of flexion , adduction & internal rotation & shortening of affected limb.)  
 ▪ The greater trochanter is raised & gluteal head is palpable .
- Q85:** Complication as Sciatic nerve injury , 2ry osteoarthritis & avascular necrosis of femoral head .
- Q87:** in X-RAY : ( femoral head lies outside the acetabulum)( interrupted shenton's line) ( associated fractures).
- Q89:** Intracapsular fracture neck of femur most commonly in elderly , especially women , senile osteoporosis , weaken the femoral neck by a trivial twisting.
- Q90:** Mortality is about 20% during 1<sup>st</sup> 3 months after fracture
- Q91:** Avascular necrosis of femoral head in 15-35 % of cases .
- Q93:** If impacted fracture → internal fixation by 2 cannulated screws .  
 ▪ If displaced in pt < 65 years → closed reduction or open reduction then internal fixation  
 ▪ If displaced in pt > 65 years → hemiarthroplasty .
- Q100:** The blood supply of the 2 fragments is good so avascular necrosis & non union does not occur.
- Q103:** Usually in children & adults, due to severe violence , associated with other injuries.
- Q104:** displaced fractures of the lower 1/3 can injure the popliteal or femoral vessels , internal repair & reduction is needed, lateral pop.  
 ▪ Nerve can be injured by outer part of Thomas splint Knee stiffness is a serious complication .
- Q109:** Don not put a foreign body in any compound fracture.
- Q113:** Fixed traction by using a Thomas splint , cords attached to distal fragments & tied to the foot of the splint , counter traction exerted by pressure of the ring of Thomas against ischial tuberosity & soft tissues.
- Q118:** Undisplaced transverse fracture of patella , the 2 fragments are undisplaced , held in position by prepatellar expansion of quadriceps tendon & patellar retinaculæ , ttt by immobilization of knee in plaster for 6 weeks  
 ▪ Displaced transverse fracture , due to more severe trauma destroy the patellar retinaculæ → TTT by OR & IF .. then physio therapy to prevent stiffness
- Q121:** Complicated by 2ry osteoarthritis & chondromalacia patellæ.
- Q122:** accurate reduction is impossible in comminuted fractures → best is patellectomy then reconstruction of soft tissue component .



- Q123:** direct violence due to road traffic accident , fracture occurs at same level of 2 bones , usually compound
- Q127:** Complicated by: • Vascular injury • Malunion  
• Infected compound fractures \* stiffness of ankle & subtalar joints  
• Skin damage
- Delayed or non union in 20% of cases due to( soft tissue damage/infection/ inadequate immobilization / significant initial injury)
- Q134:** Pott's fracture is the commonest ankle fracture
- Stage 1: spiral fracture of fibula (lateral malleolus) . stable
  - Stage 2: avulsion fracture of medial malleolus. Unstable
  - Stage 3: further posterior dislocation of talus will occur( 3<sup>rd</sup> malleolus).
- Q136:** TTT
- ➔ Stable fractures : wt bearing below knee plaster cast for 6 weeks .
  - ➔ Unstable undisplaced fractures: non wt bearing plaster & careful follow up with x-ray for 6 weeks.
  - ➔ Unstable displaced fractures: (in young →ORIF) (elderly→ closed reduction& apply below knee plaster for 6 weeks) .
- Q142:** Complicated by ( acute exacerbation/ pathological fracture / toxemia / amyloidosis / arrest of growth ) .
- Q143:** Surgery for removal of dead bone & drainage of the cavity is the main Ttt ( antibiotics alone not enough ) .
- Q145:** Plain Xray is the most important : shows: patchy thickened bones, irregular sclerosis surrounding bony cavity that contains sequestra .
- Q146:** Commonest presentation is a sinus discharging pus & small pieces of sequestra .
- Pain& swelling ... atrophy of surrounding muscles .
- Q148:** Sequesterectomy , saucerization of bone cavity for adequate drainage , obliteration of dead space by cancellous bone chips or local muscle flaps , excision of sinus tract .
- Q151:** Seen in any age but usually in young adults , asymptomatic
- Pain & swelling
  - Usually in short long bones of the hand
  - May be solitary or multiple (Oillier's disease).
- Q155:** TTT not always needed unless it is large or causing pathological fracture .. excision or curettage & replace by bone graft .
- Q157:** may be single or multiple , usually in adolescent .. painless lump
- Pain may develop from overlying bursae or impingement on soft tissue or parathesia due to stretching of adjacent nerves .
- Q158:** Osteochondroma is one of commonest bone tumors ,
- Arise from METAPHYSIS of long bones .
- Q160:** Features suggestive of malignancy : pain , rapid growth , invasion of motherbone& recurrence after excision.
- Q162:** Best TTT is excision .



**Q163:** Osteosarcoma , commonest 1ry malignancy in bone , usually in children & young adults

- 80% in metaphysis
- 80% in children , 80% in lower limbs
- 80% around Knee

**Q166:** X-ray shows :

- Hazy osteolytic areas alternate with osteoblastic areas , new bone formation radiating outwards from cortex → sunburst or sun ray appearance , reactive new bone form. At angle of periosteal elevation → codman's triangle.

**Q167:** LOCAL control of the tumor by amputation or wide excision and prosthetic replacement (Adjuvant chemotherapy markedly improves the diagnosis) .

**Q171:** Usually a young adult (20-40 yrs) complain of pain at end of long bones .

**Q172:** X-ray: soap bubble appearance & medullary plug at junction of the tumor & shaft

- Absence of this plug indicate malignant transformation.

**Q173:** common sites are the distal femur , proximal tibia proximal humerus , distal radius

- Many types from benign to frankly malignant ( locally malignant ) .

**Q175:** radiotherapy only for surgically inaccessible tumors

- Other cases surgery is the main Ttt either amputation or curettage & bone grafting .

**Q179:** Chondrosarcoma tends to metastasize late so at least one attempt at wide local excision is justified , where neither excision or amputation is feasible , radio therapy may be used but response is poor .

**Q183:** METASTATIC bone deposits is the most frequent bone tumors .

- Usually above age of 50-70 .
- Pain & pathological fracture may occur.

**Q185:** The commonest source are carcinoma of breast , prostate , kidney, lung , thyroid & 10% non-detected origin .

- Metastasis appear in areas containing red marrow .

**Q188:** Radioscinitigraphy is the most sensitive method to detect silent metastasis , areas of increased activity selected for Xray examination .

- In x-ray most skeletal deposits are osteolytic appear as rare areas in medulla or moth eaten appearance in cortex

**Q192:** very bad prognosis

- TTT is palliative ( radiotherapy- chemotherapy- pathological fracture → ORIF).

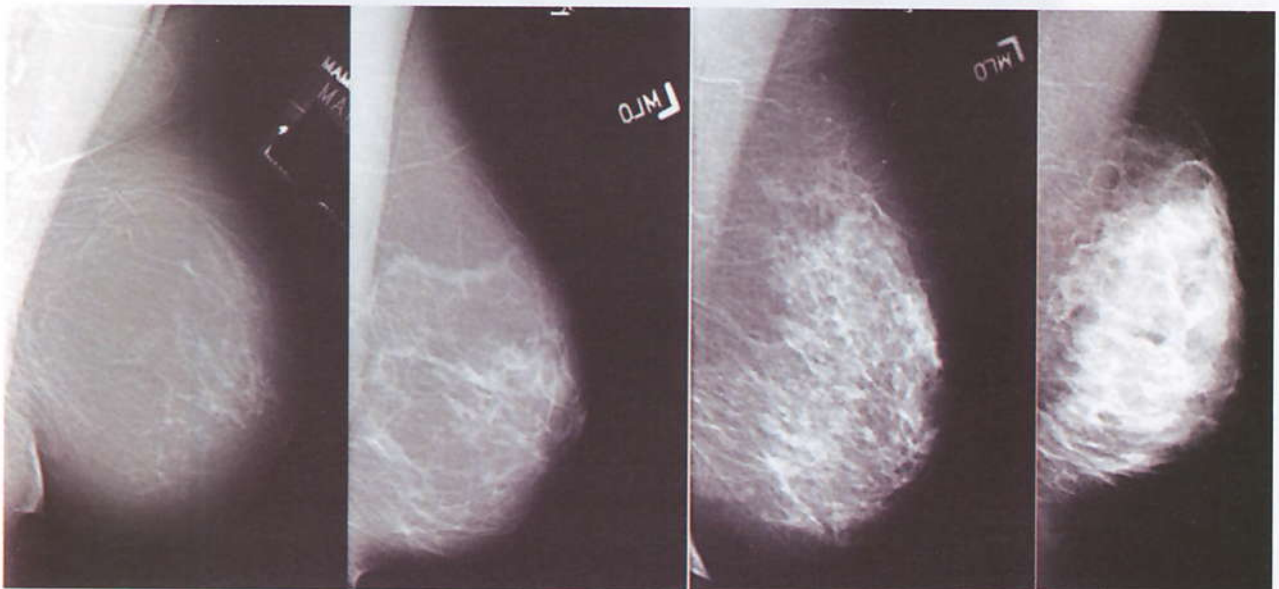
**-9-**

# **Breast Radiology**

- Normal appearance of breast varies with age
- With progress of age a female breast loses some of its glandular elements and becomes less dense on a mammogram
- It is therefore, easier to pick up tumour nodules in younger females



## Normal Appearance



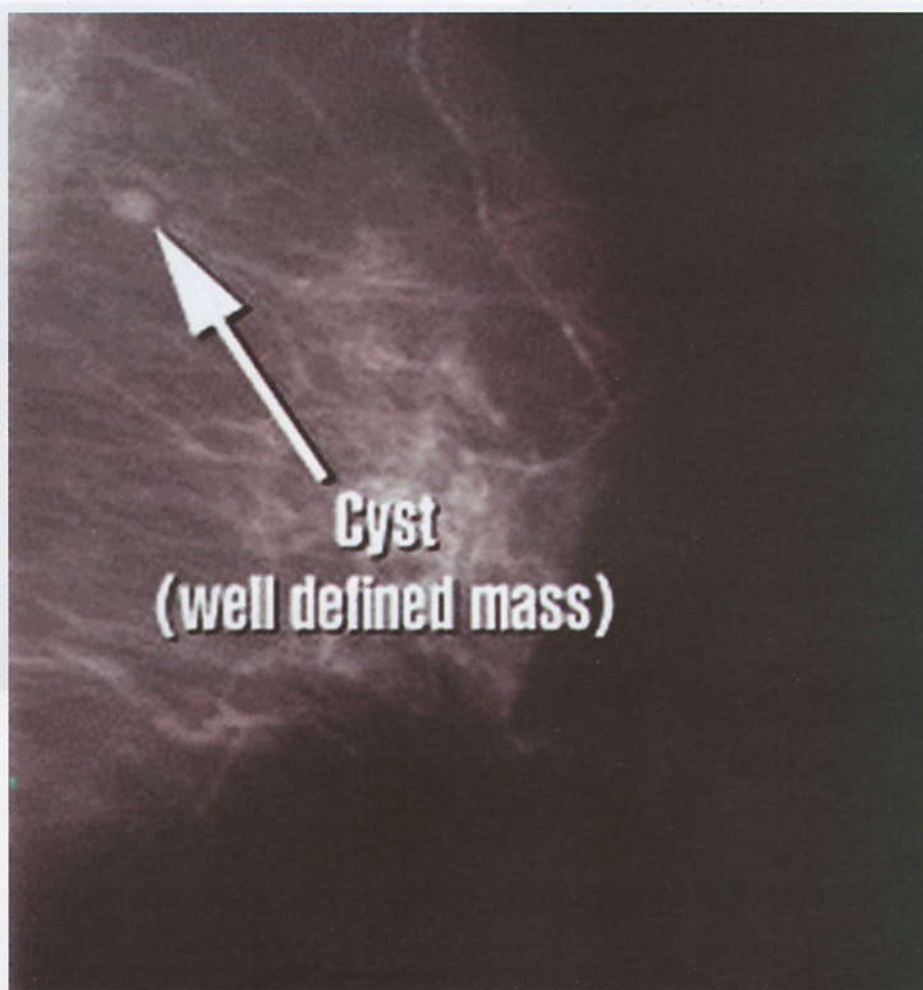
Elderly

young( dense &amp; full of glands)

### Normal mammogram

- Normal appearance of breast varies with age
- With progress of age a female breast loses some of its glandular elements and becomes less dense on a mammogram.
- It is, therefore, easier to pick up tumor shadows in elderly females.

## Benign Lesions



### Fibroadenoma or cyst

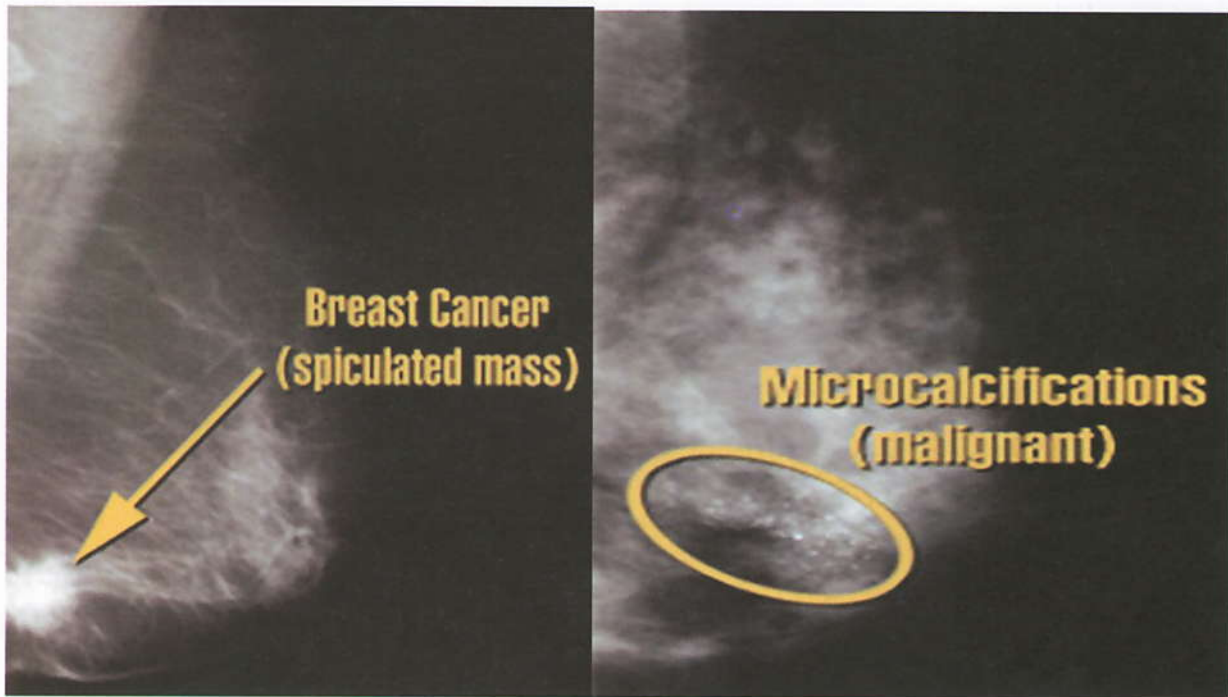
- Mammograms
- Well-defined radio-opaque mass without microcalcifications are either fibroadenomas or cysts

### Questions (True or false)

1. Mammography is better than US in diagnosis of breast lesions in young females ( )
2. Mammography is used in screening programs. ( )
3. Mammography & US are enough for diagnosis of breast lesions without biopsy. ( )
4. The contrast used in this study is Lipidol ( )
5. The study is an accurate to diagnose a mass in young females ( )
6. This study is confirmative for malignancy ( )
7. FNAC is the next investigation required ( )



# Malignant Lesions



## Breast cancer

- Mammograms
- Opaque shadows with irregular outline
- Stippled microcalcifications suggest breast cancer
- Radiographic diagnosis is breast cancer, which needs confirmation by FNA, True-cut biopsy, or excision biopsy

## Questions (True or false)

8. The lesion seen in this study is mostly malignant ( )
9. Most common clinical presentation for this condition is painless breast lump. ( )
10. Skin ulceration, bleeding per nipple & distant metastasis are possible complications. ( )
11. The next step after mammography & US should be fine needle aspiration biopsy ( )
12. Radical surgery is the treatment of choice in early cases ( )
14. Simple mastectomy can be a diagnostic procedure ( )

**Breast Key answer**

|           |              |
|-----------|--------------|
| <b>1</b>  | <b>FALSE</b> |
| <b>2</b>  | <b>True</b>  |
| <b>3</b>  | <b>FALSE</b> |
| <b>4</b>  | <b>FALSE</b> |
| <b>5</b>  | <b>FALSE</b> |
| <b>6</b>  | <b>FALSE</b> |
| <b>7</b>  | <b>True</b>  |
| <b>8</b>  | <b>True</b>  |
| <b>9</b>  | <b>True</b>  |
| <b>10</b> | <b>True</b>  |
| <b>11</b> | <b>True</b>  |
| <b>12</b> | <b>True</b>  |
| <b>13</b> | <b>FALSE</b> |



**Important points & tweets based on our questions:****Q1:**

- Mammography is a soft tissue radiography of breast , 95% accuracy in diagnosing breast cancer & accuracy improves if combined with biopsy
- Also detect multifocal lesions in same & other side
- LESS diagnostic in young women .

**Q2:**

- Used for screening of high risk population & assess the other breast for multifocal lesions

**Q3:**

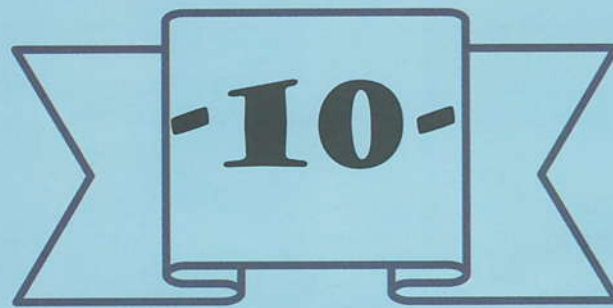
- A pathological evidence of malignancy is the corner stone of diagnosis.

**Q8:**

- Cancer in mammography appears as:
- A dense opacity that has an indefinite outline from which irregular spicules penetrate into the surrounding breast .
- Clustered micro calcification are 20% malignant .

**Q11:**

- The most common presentation of breast cancer is painless lump
- You should examine both breasts, axillae, supraclavicular regions and arms
- Skin dimpling and tethering are due to infiltration of cooper's ligaments
- Mastaitiscarcinomatosis → considered stage IV breast cancer



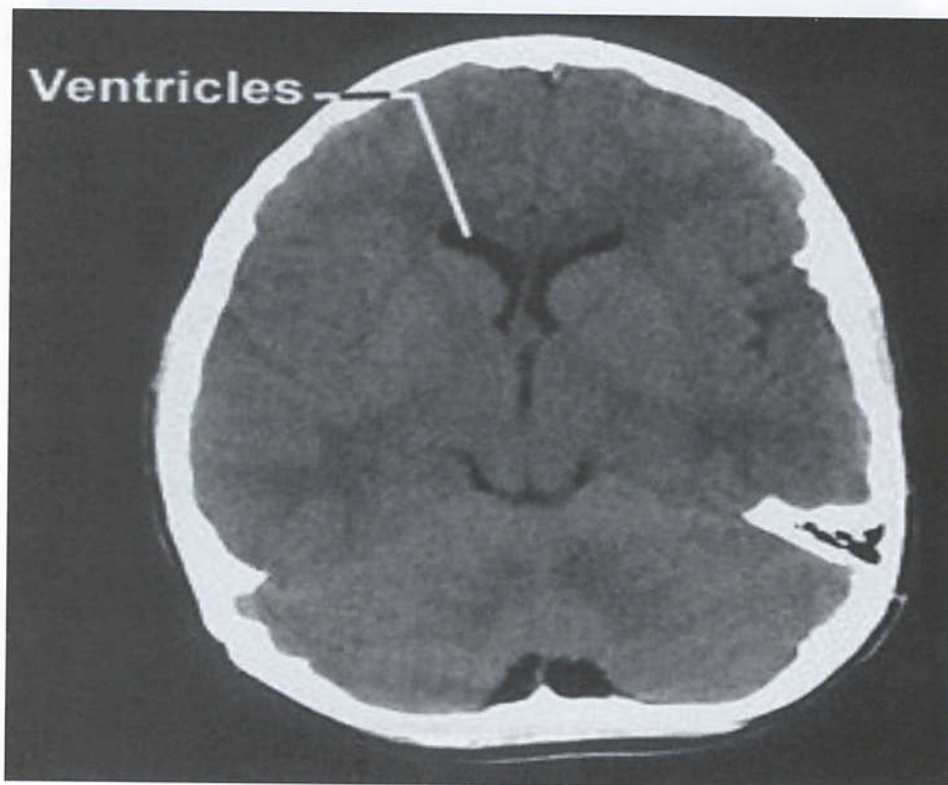
**Neuro-  
Surgery  
Radiology**



## Head Normal Appearance

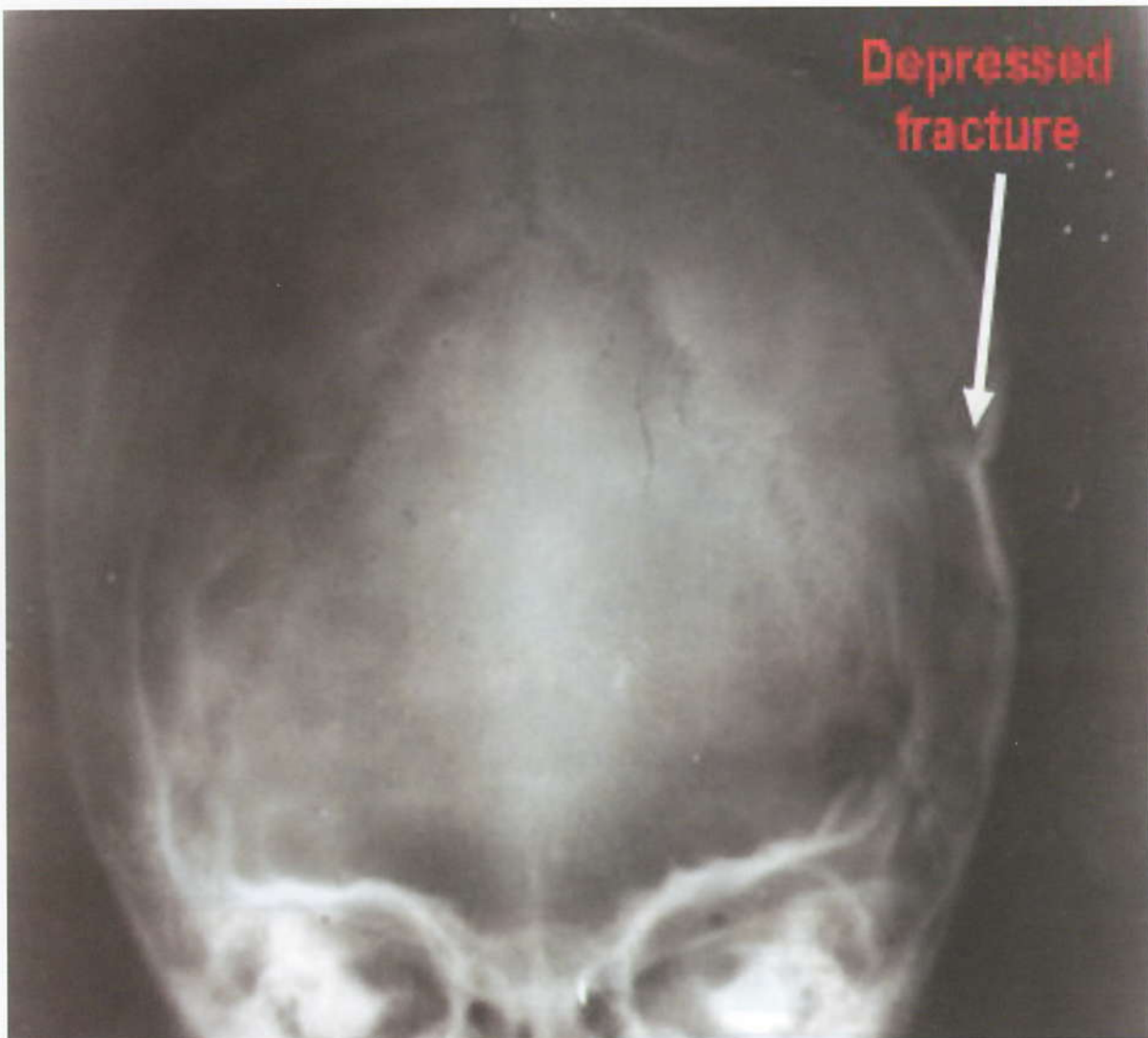


**Normal lateral skull X-ray**



**Normal CT scan of head**

## Vault Fractures



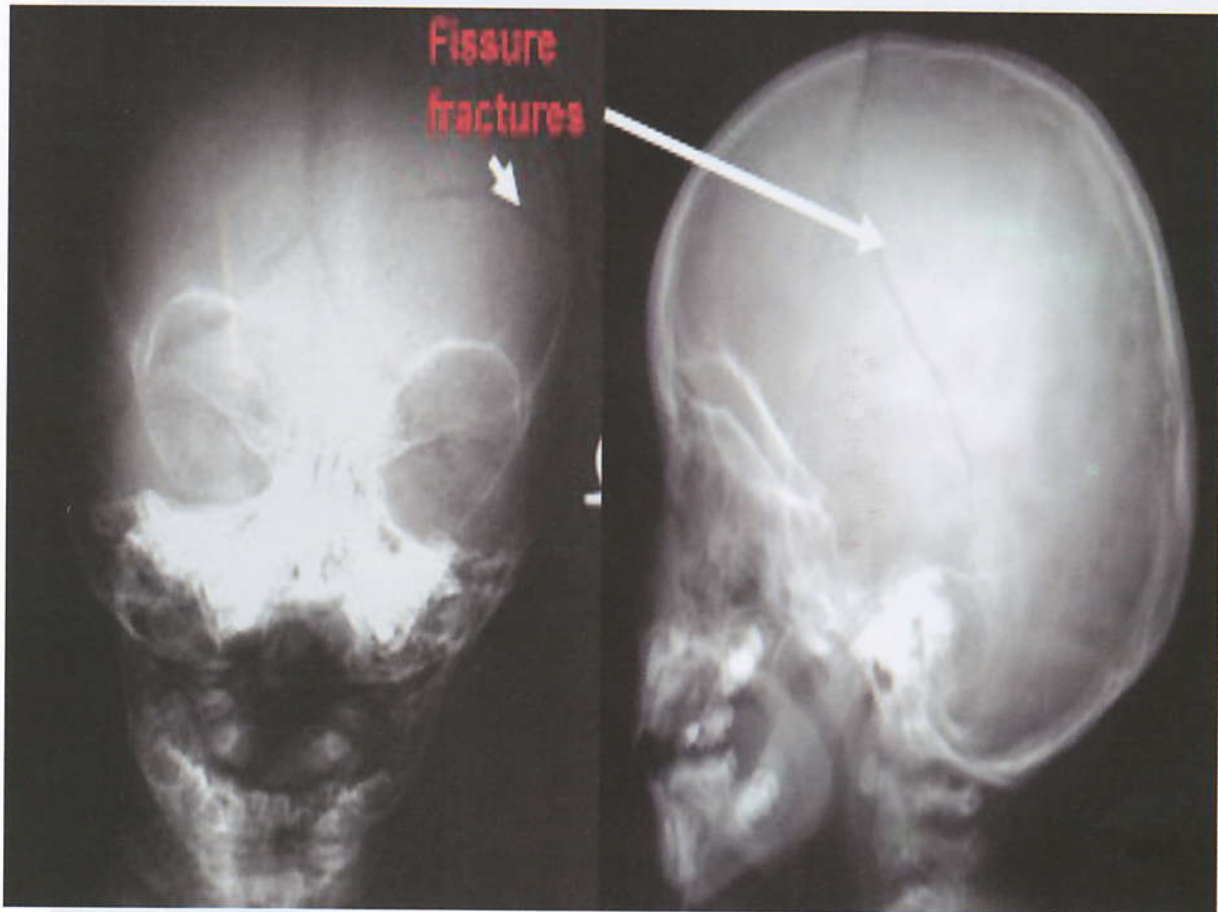
**Depressed fracture**

### Questions( True or false )

1. This type of fracture is commonly compound ( )
2. Intra-cranial Haematoma is a common complication ( )
3. Subconjunctival hemorrhage is a common clinical presentation ( )
4. Bone scan can confirm the diagnosis ( )
5. Urgent surgery is the main line of treatment ( )



# Vault Fractures



## Fissurefracture

### Questions( True or false )

6. Epistaxis and CSF leak is a common complication ( )
7. Extra-dural Haematoma can be a possible complication ( )
8. Craniostenosis can be a possible complication ( )
9. Carotid angiography is needed for detection of intra-cranial bleeding ( )
10. Surgery is indicated in complicated cases only ( )

# Extra-dural Hemorrhage



## Extradural haematoma

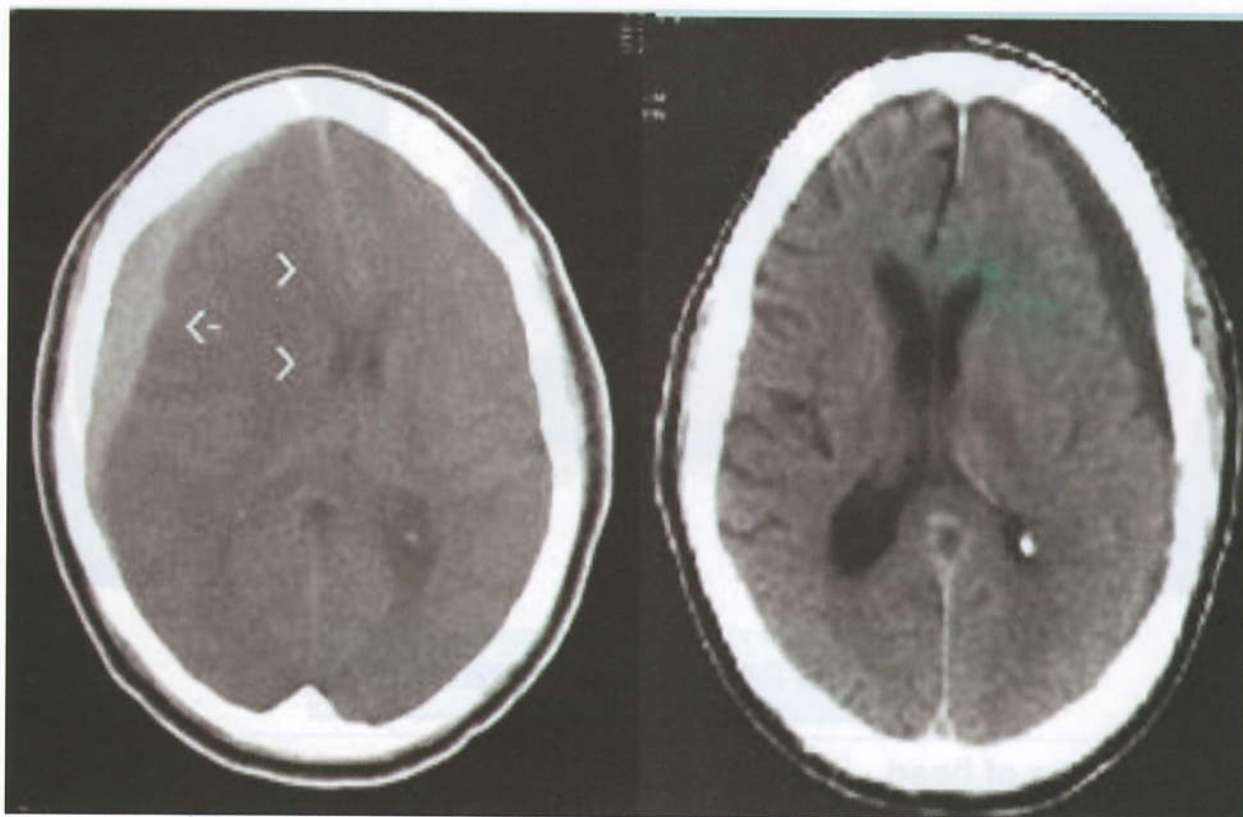
- CT scans of head
- Showing biconvex white opacities on the inner side of the skull with shift of midline structures to the opposite side.

## Questions( True or false )

11. This condition is traumatic. ( )
12. The most common cause is middle meningeal artery injury. ( )
13. It is a common complication of fracture base of the skull ( )
14. Contralateral motor deficit is a complication ( )
15. Patients usually pass from concussion stage to compression stage without lucid interval. ( )
16. Urgent surgical treatment is required for this condition. ( )



# Sub-dural Hemorrhage



**Acute subdural  
haematoma**

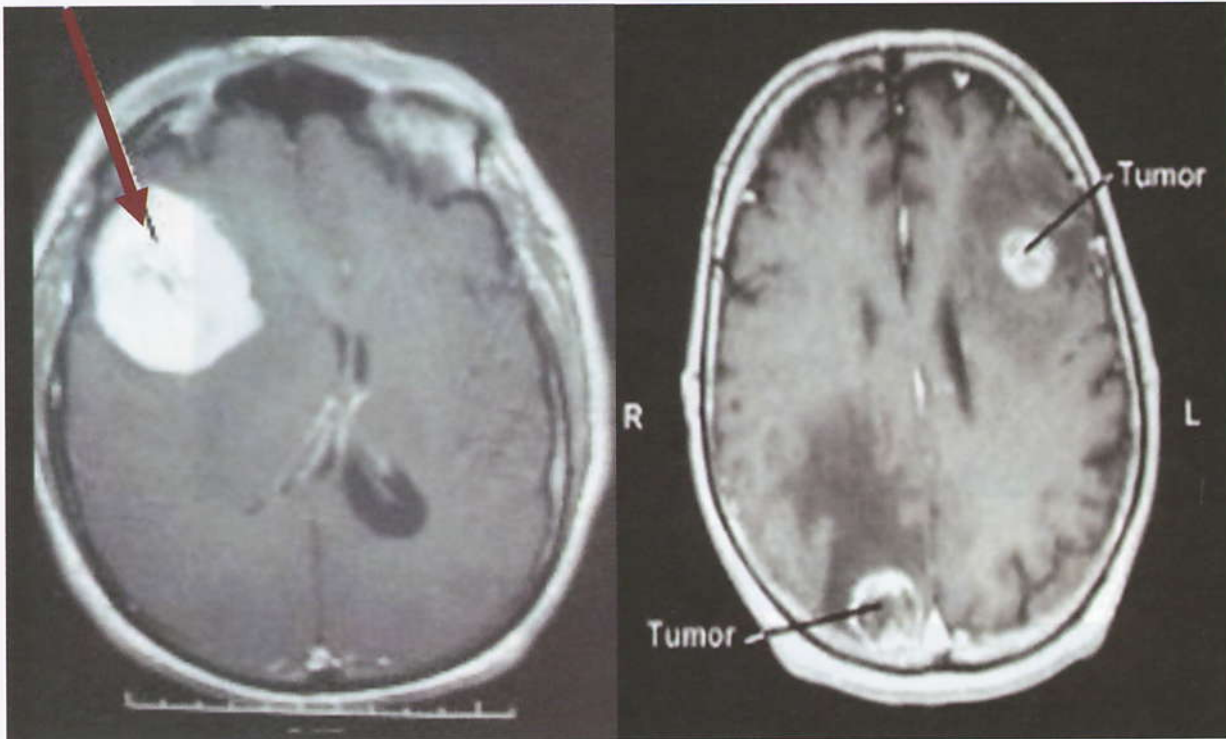
**Chronic subdural  
haematoma**

- CT scans of head
- Subdural haematomas look concavo-convex.
- Notice also shift of midline structures to the opposite side.
- Acute haematomas are white, while chronic haematomas lose their density by time.

## Questions( True or false )

17. The underlying cause is pathological ( )
18. This condition occurs spontaneously. ( )
19. This patient is present with manifestations of  $\uparrow$  ICP ( )
20. This condition occurs mostly due to injury of bridging cerebral veins. ( )
21. Hydrocephalus is a common complication ( )
22. Lumbar puncture is a useful investigations ( )
23. Medical treatment is the main line of treatment. ( )

# Brain Tumors



## Meningioma

- CT scan of head.
- Notice the mass and shift of midline structures.
- A meningioma is commonly a benign tumor that is markedly enhanced by IV contrast administration

## Metastases

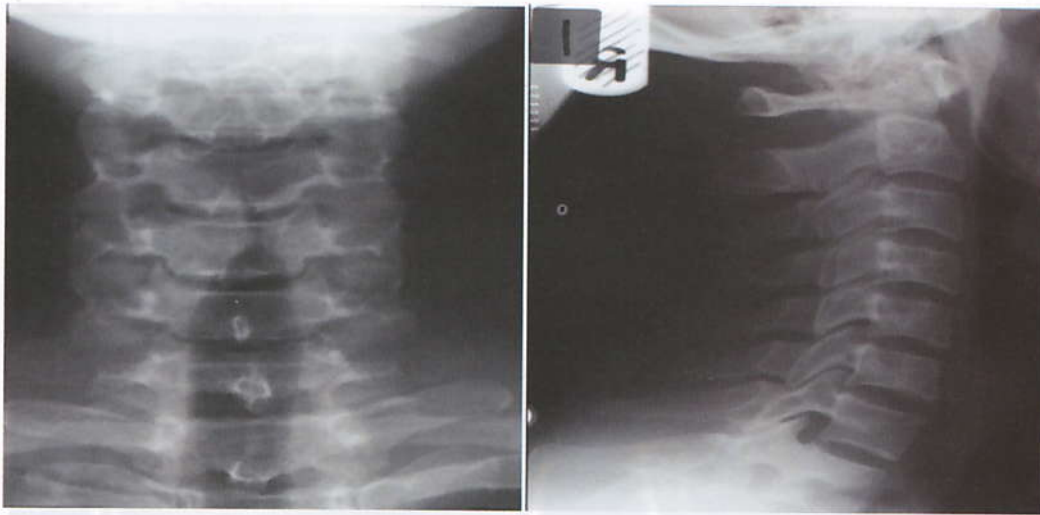
- CT scan of head.
- Metastases are the commonest brain malignancies.
- They are usually multiple and are surrounded by an oedema zone that looks grey on this film

## Questions( True or false )

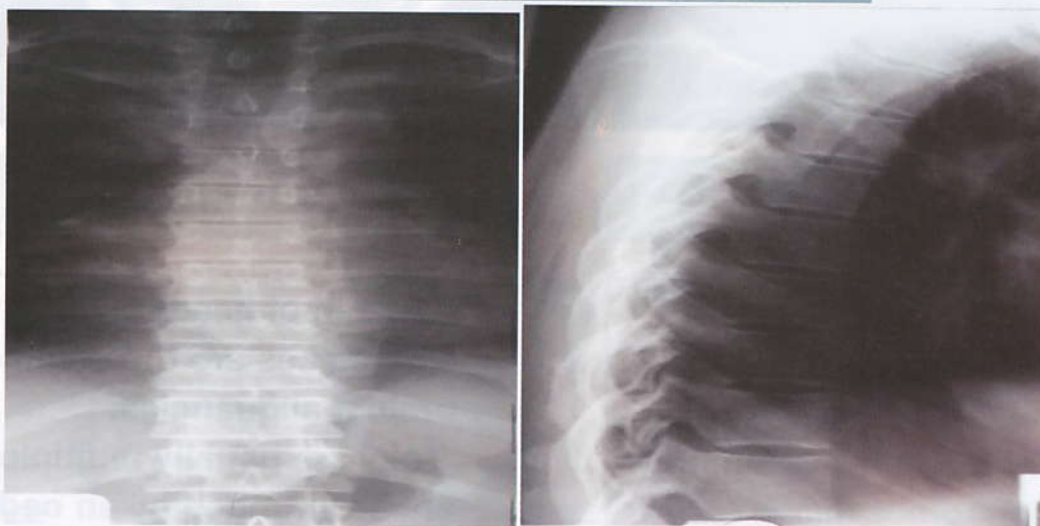
24. Brain metastases are the most common brain malignancies. ( )
25. There is evidence of hydrocephalus seen in this study ( )
26. Brain tumors show central enhancement while brain abscess shows ring enhancement in CT with contrast. ( )
27. Patients of brain tumors present with manifestations of  $\uparrow$ ICP ( )
28. Biopsy can confirm the diagnosis of brain abscess. ( )
29. Palliative treatment is the main line of treatment ( )
30. Surgical treatment is the main line of treatment of meningioma. ( )



# Normal Spine Appearance



**Normal cervical spine**

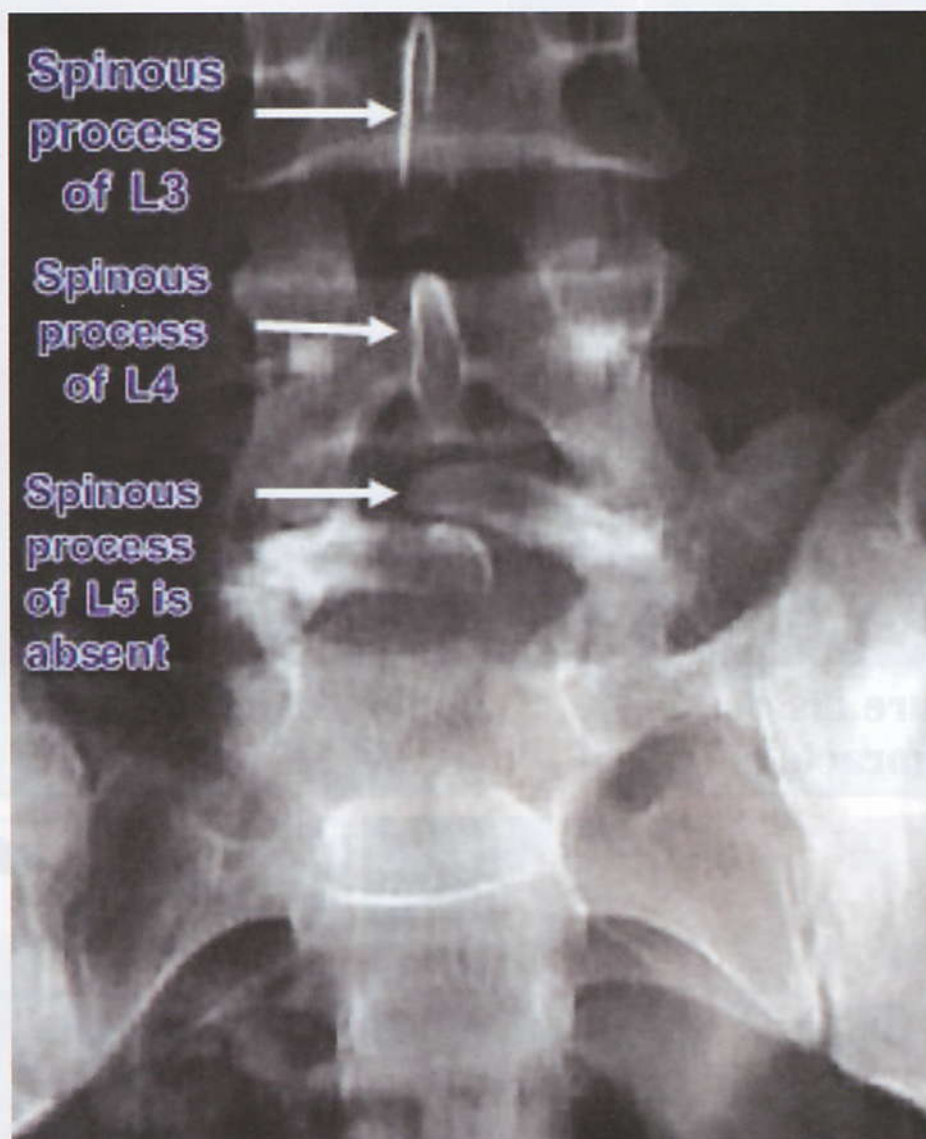


**Normal thoracic spine**



**Normal lumbar spine**

# Spina Bifida



**Spina bifida**

## Questions(True or false)

31. This is a Plain x. ray ( )
32. Most common site of this condition is lumbo-sacral vertebrae. ( )
33. Subtypes of this condition are occulta & manifesta. ( )
34. There is a congenital absence of post. Neural arch of vertebrae ( )
35. Surgical repair is the only line of treatment ( )



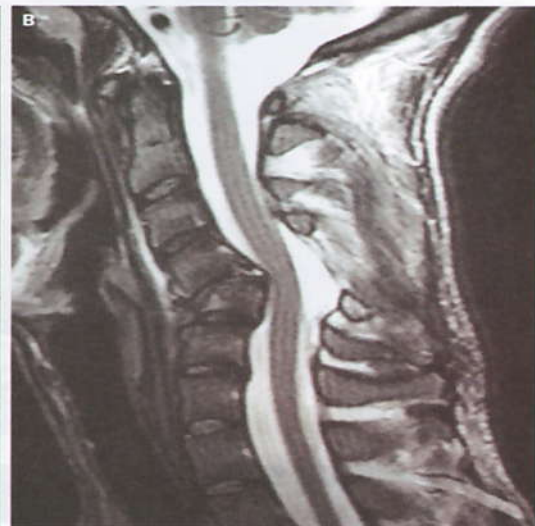
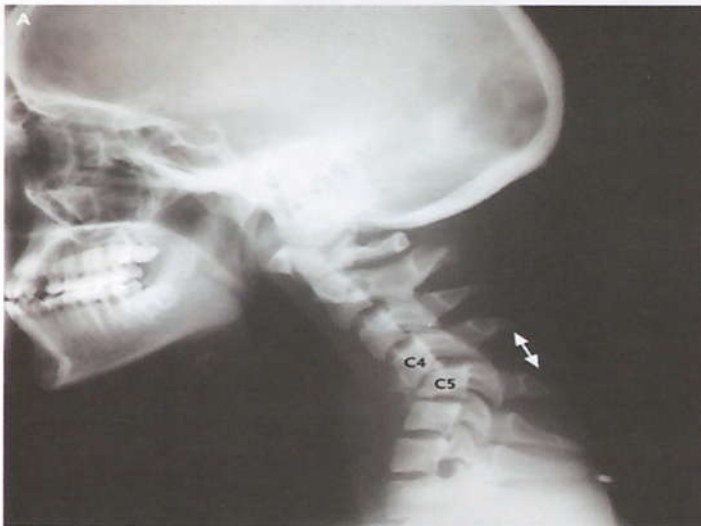
# Spine Fractures & Dislocations



**Fracture dislocation  
of thoracic spine**



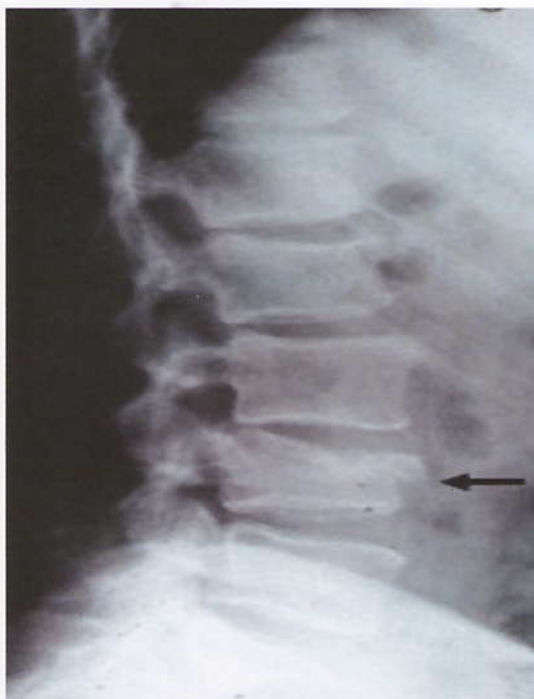
**Dislocation of  
cervical spine**



## Questions( True or false )

- |                                                                |     |
|----------------------------------------------------------------|-----|
| 36. Myodil myelography is an old invasive technique.           | ( ) |
| 37. Myodil myelography is urgently indicated                   | ( ) |
| 38. The cause is a flexion rotation injury                     | ( ) |
| 39. This is unstable fracture                                  | ( ) |
| 40. The spinal cord is usually affected                        | ( ) |
| 41. MRI is essential investigation to evaluate this condition. | ( ) |
| 42. Urgent surgery is required                                 | ( ) |
| 43. Surgery is reserved for complicated cases only.            | ( ) |

# Spine Fractures & Dislocations



**Comminuted fracture  
of 4<sup>th</sup> lumbar vertebra**



**Wedge compression  
fracture of 2<sup>nd</sup> lumbar**

## Questions( True or false )

### Comminuted fracture

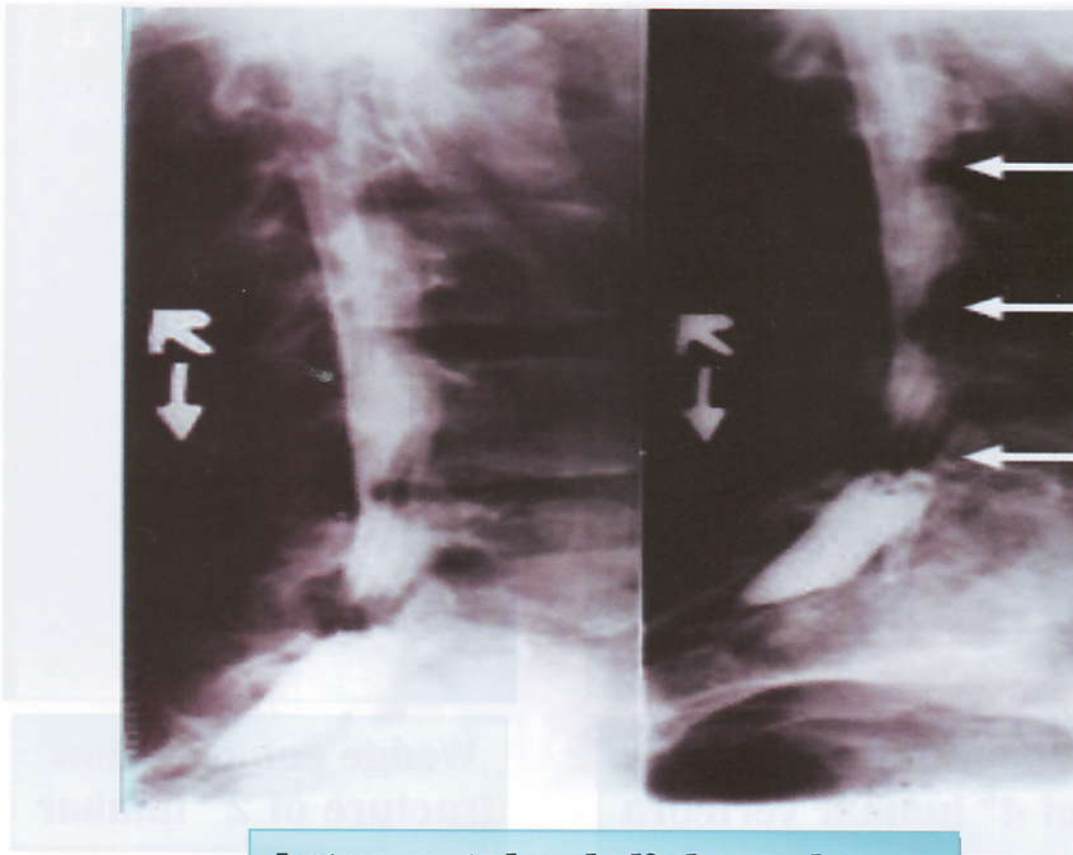
- 44. The spinal cord is usually affected ( )
- 45. This is a pathological fracture ( )
- 46. The fracture seen is at the level of L4 ( )
- 47. Myodil myelography is urgently indicated ( )
- 48. Internal fixation is a line of treatment ( )

### Wedge compression

- 49. This is a wedge compression fracture ( )
- 50. This a stable fracture ( )
- 51. The fracture seen is at the level of L3 ( )
- 52. Multiple metastatic deposits are seen ( )
- 53. Internal fixation is a line of treatment ( )



# Disc Prolapse



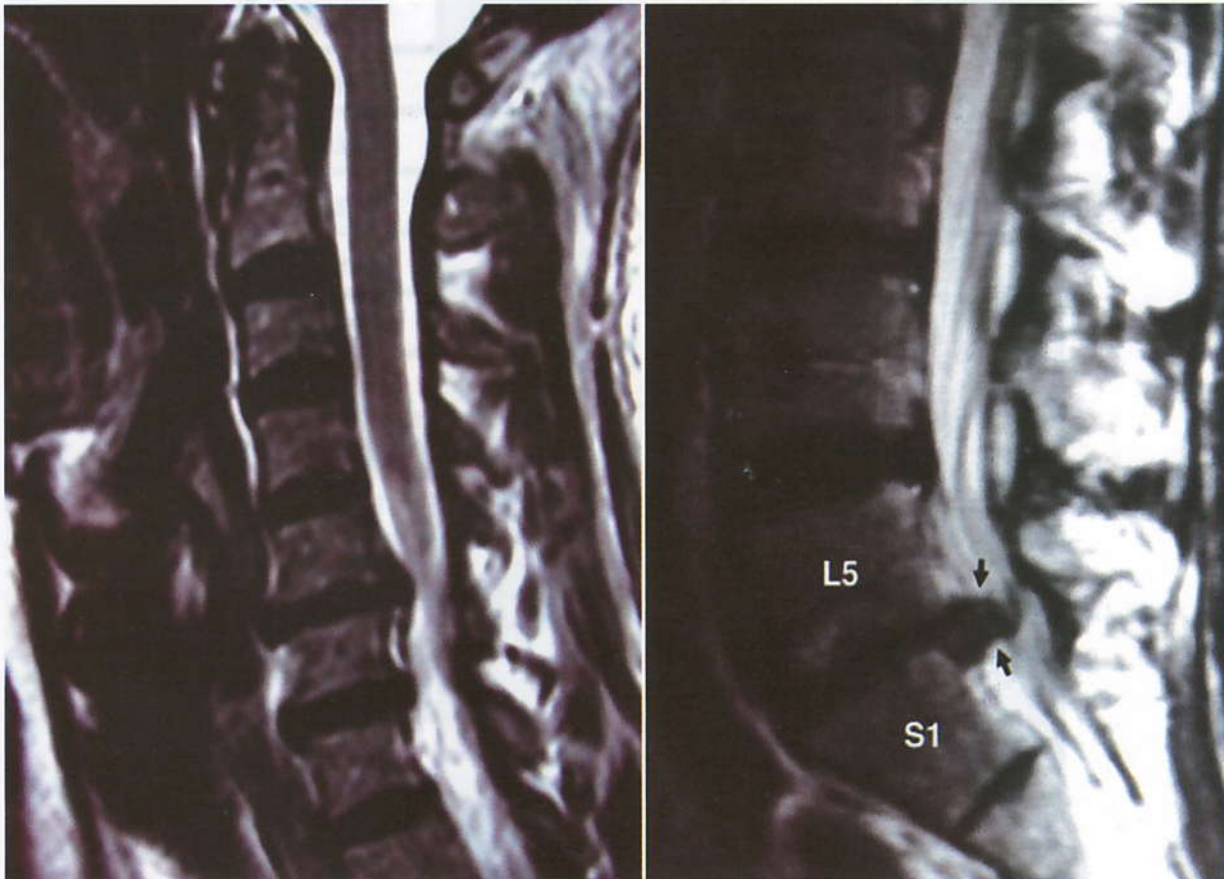
## Intervertebral disk prolapse

- Myodil myelography is an old invasive method of diagnosis of intervertebral disk prolapse.
- In this case there are multiple levels of narrowing of myodil column in the sub-arachnoid space.
- Picture is suggestive of multiple-level disk prolapse

## Questions( True or false )

- |                                                          |     |
|----------------------------------------------------------|-----|
| 54. This is a barium swallow                             | ( ) |
| 55. There is a dye seen in the spinal canal              | ( ) |
| 56. The underlying cause could be a degenerative disease | ( ) |
| 57. MRI is an essential investigation for this patient   | ( ) |
| 58. Surgery is only reserved for complicated cases       | ( ) |

# Disc Prolapse



## Intervertebral disk prolapse

- MRI is a non-invasive examination that clearly shows the lesion
- Prolapse of disk between L5 and S1
- MRI is the imaging test of choice for detection of disk prolapse



# Neurosurgery Key answer

|    |       |
|----|-------|
| 1  | True  |
| 2  | True  |
| 3  | FALSE |
| 4  | FALSE |
| 5  | True  |
| 6  | FALSE |
| 7  | True  |
| 8  | FALSE |
| 9  | FALSE |
| 10 | True  |
| 11 | True  |
| 12 | True  |
| 13 | FALSE |
| 14 | True  |
| 15 | FALSE |
| 16 | True  |
| 17 | FALSE |
| 18 | FALSE |
| 19 | True  |
| 20 | True  |
| 21 | FALSE |
| 22 | FALSE |
| 23 | FALSE |
| 24 | True  |
| 25 | FALSE |
| 26 | True  |
| 27 | True  |
| 28 | True  |
| 29 | FALSE |

|    |       |
|----|-------|
| 30 | True  |
| 31 | True  |
| 32 | True  |
| 33 | True  |
| 34 | True  |
| 35 | True  |
| 36 | True  |
| 37 | FALSE |
| 38 | True  |
| 39 | True  |
| 40 | True  |
| 41 | True  |
| 42 | True  |
| 43 | FALSE |
| 44 | FALSE |
| 45 | FALSE |
| 46 | True  |
| 47 | FALSE |
| 48 | FALSE |
| 49 | True  |
| 50 | True  |
| 51 | FALSE |
| 52 | FALSE |
| 53 | FALSE |
| 54 | FALSE |
| 55 | True  |
| 56 | True  |
| 57 | True  |
| 58 | True  |

## Important Points & Tweets based on our Questions

**Q2:**

- In compound depressed fracture there may be profuse bleeding, leakage of CSF, prolapsed of portion of the brain & liability to infection

**Q5:**

- For closed depressed fractures → mainly conservative Ttt, surgery indicated only if depressed segment is (>1 inch large with possibility of dural tear) (compresses an important area) (cosmetic deformity) (overlying an air sinus)
- For compound depressed fracture → surgery under complete aseptic conditions.

**Q10:**

- IN fissure fracture Ttt of associated cerebral damage, if its site is overlying the course of MMA, possibility of extradural hematoma should be detected.

**Q11:**

- Trauma affecting side of the skull cause fracture Temporal or parietal bone and dura driven inward & injure the MMA branches.

**Q14:**

- Contralateral hemiparesis due to compression of ipsilateral cerebral cortex.

**Q15:**

- Lucid interval during which patient recovers from initial concussion and may resume his activities, during this period blood accumulates gradually in extradural space.

**N.B.:**

- An extradural hematoma can occur without skull fracture in children as they have an elastic skull

**Q17:**

- Acute subdural haematoma follows severe blow to skull leading to rupture of a large cortical veins as it crosses subdural space to reach fixed subdural venous sinuses
- NB. No lucid interval, persistent loss of consciousness
- Mortality is 50 %.

**Q24:**

- The commonest intracranial neoplasm is metastases
- The most significant findings pointing to an intracranial tumor, on physical examination, are the presence of papilloedema and signs of focal damage to the nervous system
- Gliomas are the commonest of primary CNS neoplasm
- The commonest site of meningiomas are the parasagittal, sphenoid wing, and olfactory groove regions.

**Q30:**

- IN cases of malignant brain tumors or metastasis, adjunctive therapy is of utmost importance to improve prognosis
- Radio & chemo therapy are supplementary to surgical excision.

**Q 32:**

- Commonest site is lumbar vertebrae



**Q33:**

- Spina bifida occulta about 10% of population
- The development is nearly normal except for a bifid spine, skin is connected with the meninges by fibrous band (membrana reunions).
- Meningio myelocele is the commonest type of spina manifesta

**Q35:**

- SPINA BIFIDA occulta needs no TTT except the membrane reunions could be divided if causing incontinence.

**Q37:**

- Plain xray (AP- lateral) VIEWS & a special view through open mouth is needed to assess atlas vertebrae
- Cervical spine film should show all seven cervical vertebrae & T1.

**Q41:**

- MRI & CT scan must be done to assess encroachment on spinal cord

**N.B:**

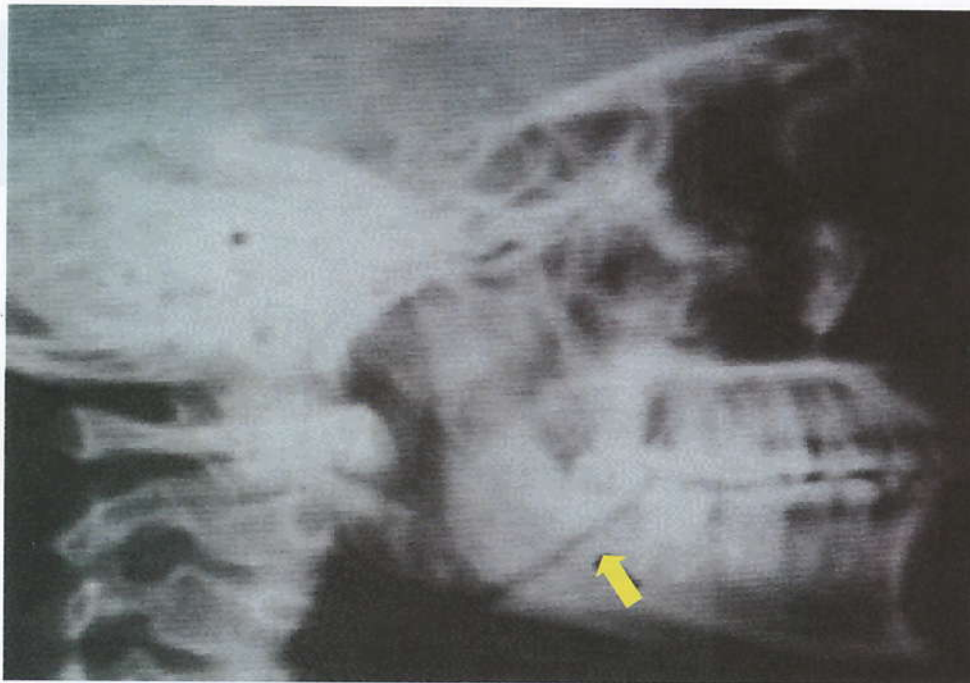
- Pt may be shocked, quadriplegic, warm hand & foot (due to pulling of blood)

**-11-**

# **Miscellaneous Radiology**

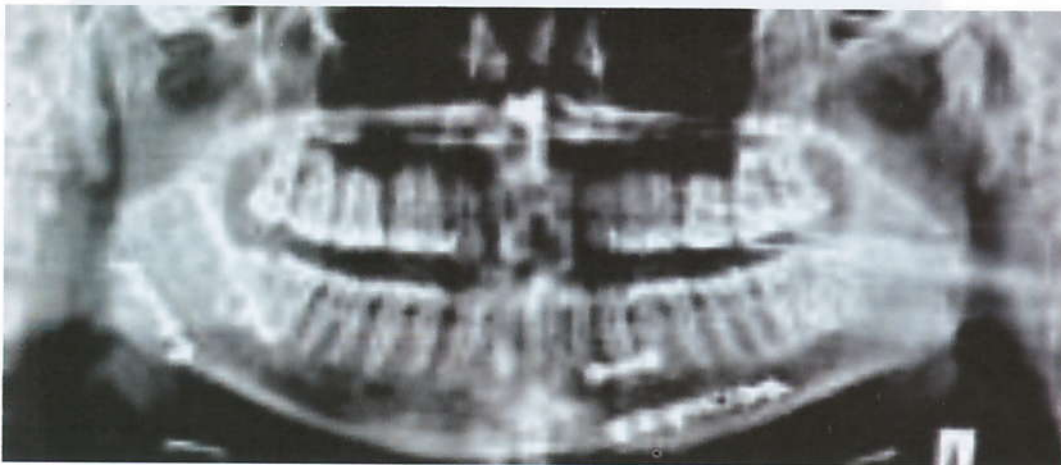


# Jaw



## Mandible fracture

- Plain X-rays showing mandible fracture



- Panoramic view.
- This is the commonest site of mandible fracture.
- The fracture is fixed by plates and screws

## Questions (True or false)

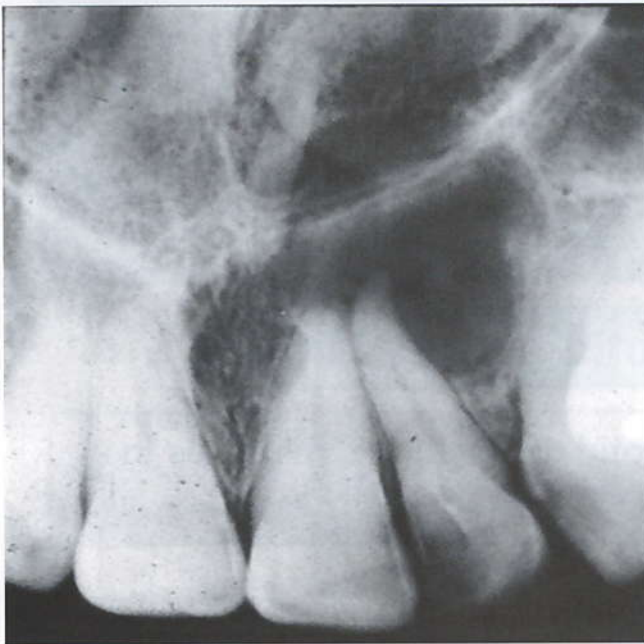
1. The cause is pathological ( )
2. This is the most common site for fracture mandible. ( )
3. This fracture is associated with irregular occlusion of teeth. ( )
4. Panoramic view study is the best investigation. ( )
5. Surgical treatment is the main line of treatment. ( )

# Jaw



## Adamantinoma (ameloblastoma)

- A multilocular cyst at the angle of the mandible



## Dental cyst

- Is seen as unilocular cyst related to carious tooth

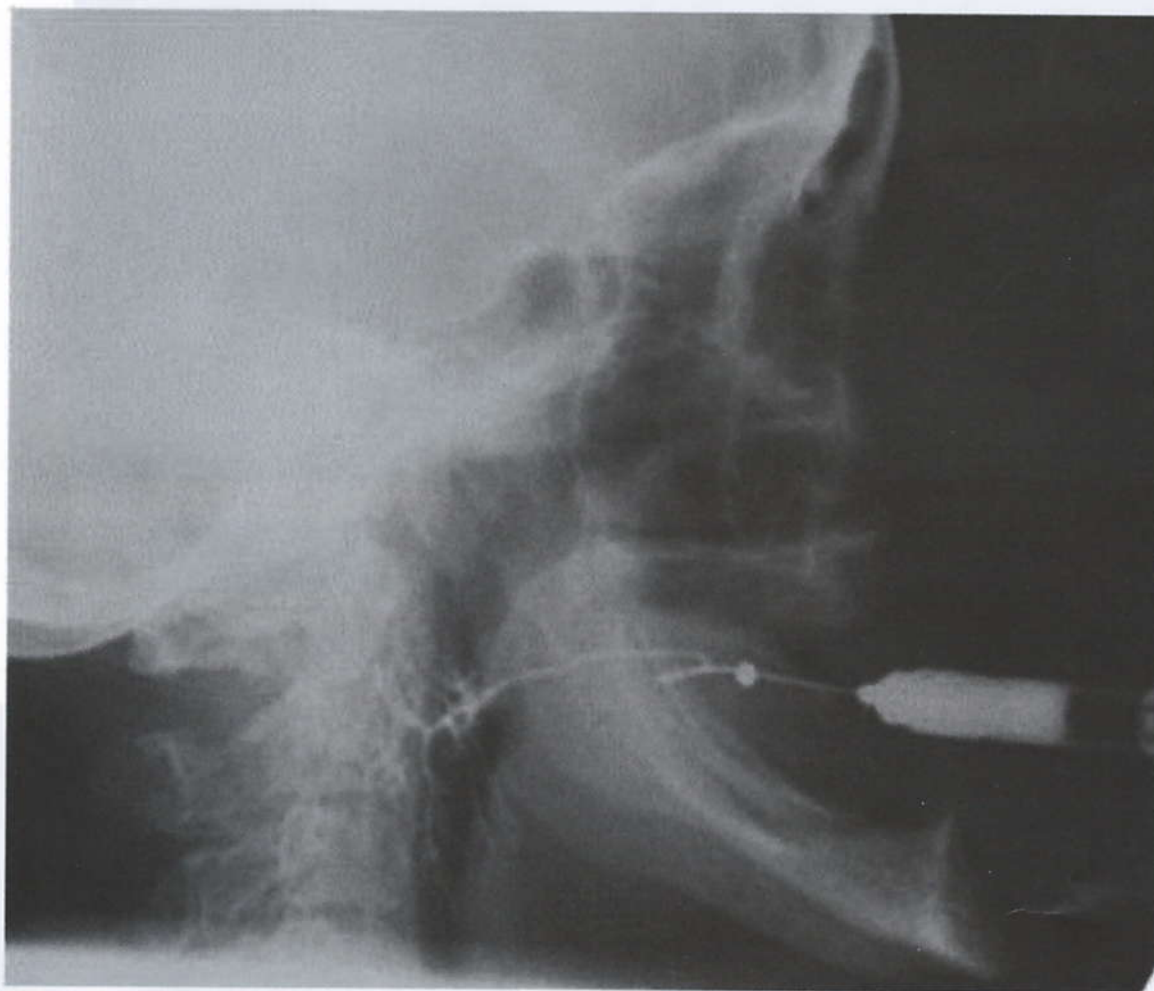


## Dentigerous cyst

- A unilocular cyst of the jaw that contains an unerupted tooth



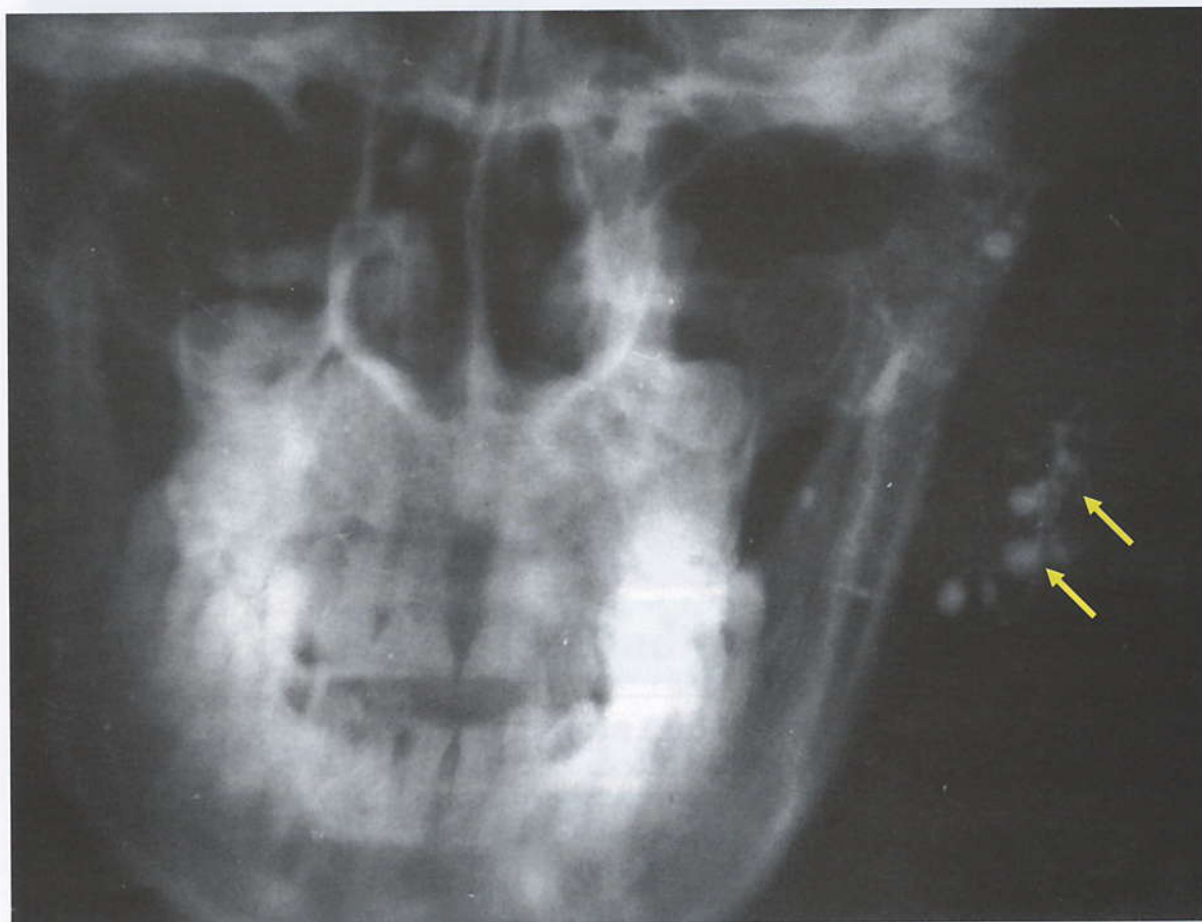
## Salivary Glands



### Normal parotid sialogram

- Showing branches of the parotid duct which diminishes in size with branching.

# Salivary Glands



## Sialectasis

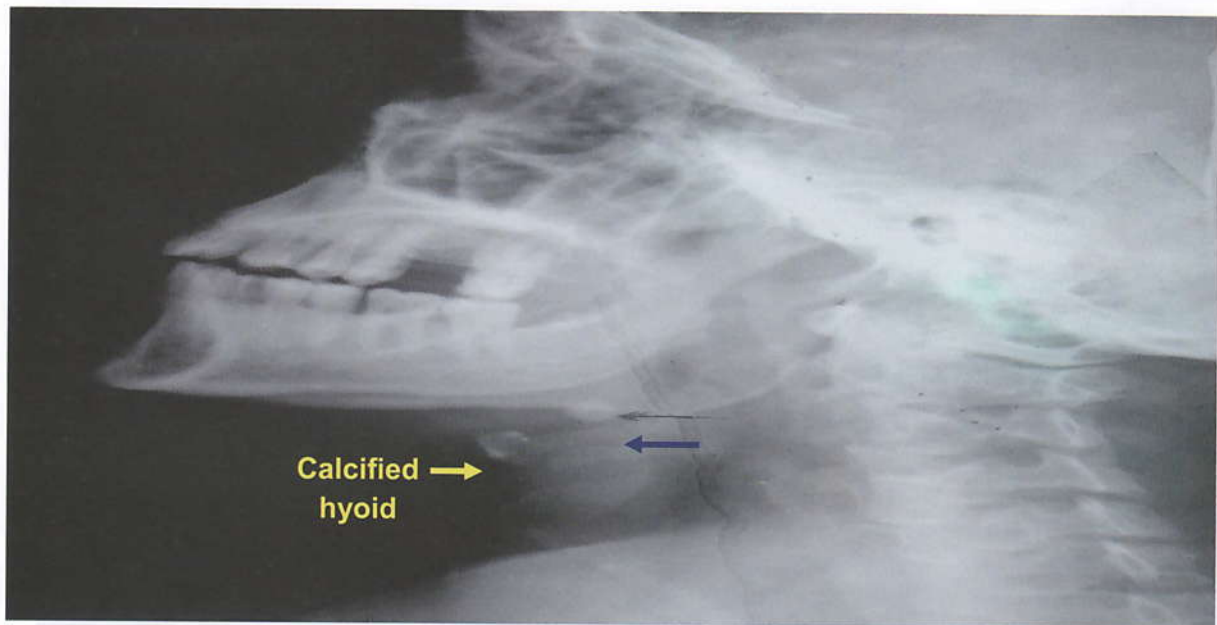
- Parotid sialography.
- Parotid duct branches get bigger in size.
- This causes stasis and recurrent sialadenitis

## Questions (True or false)

6. There is a stricture seen in the parotid duct ( )
7. The contrast material used in this condition is lipidol. ( )
8. This condition is presented clinically with recurrent sialadenitis. ( )
9. Radiological sign seen is snow storm appearance. ( )
10. The main line of treatment for this condition is conservative. ( )
11. Surgery is reserved for complicated cases only ( )



# Salivary Glands



## Submandibular stones

- Plain X-rays show radio-opaque stones in submandibular region

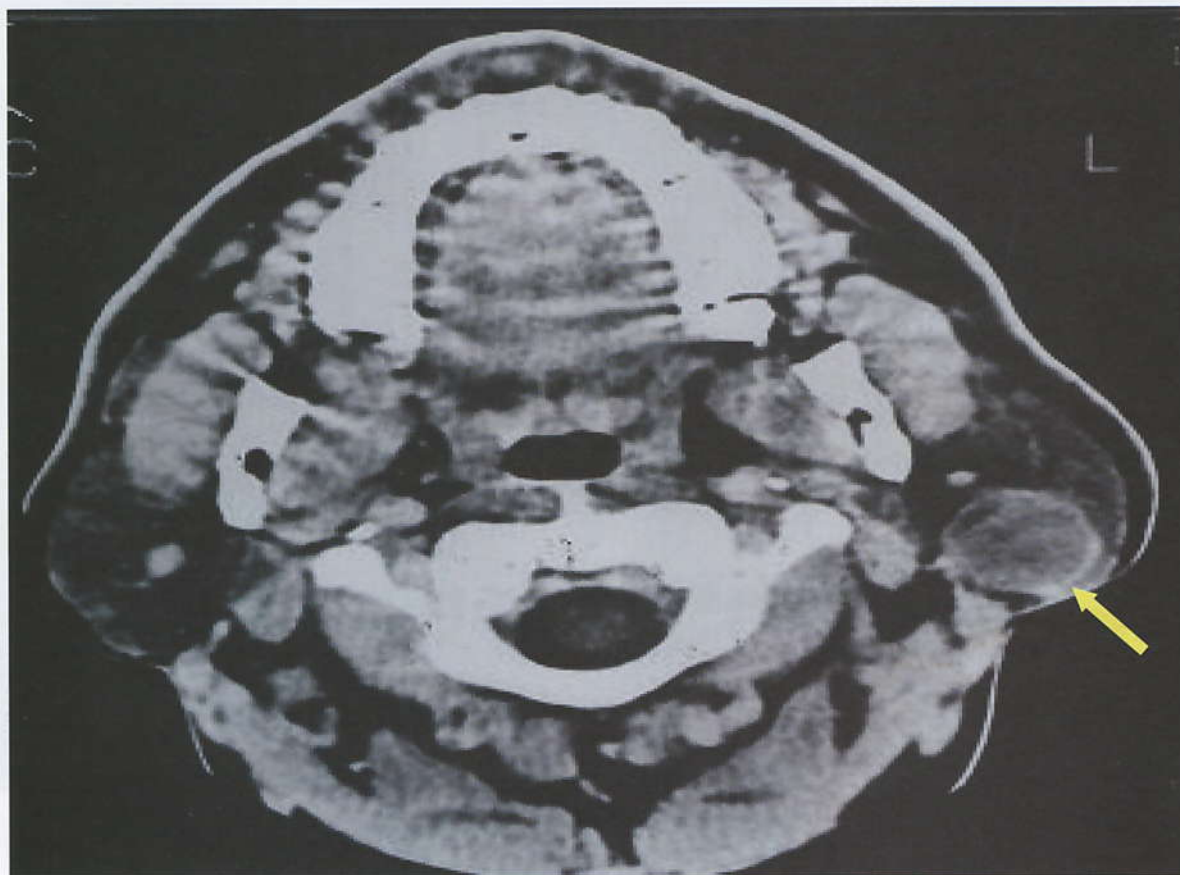


- Occlusal view is best for detecting submandibular stones

## Questions (True or false)

12. Occlusal view is the best view to detect submandibular stone. ( )
13. Submandibular stones represent about 80% of salivary stones. ( )
14. Complete obstruction of submandibular duct causes pain & swelling of submandibular gland before or during meals. ( )
15. Treatment of choice for submandibular gland stone is surgical removal of the gland. ( )
16. The condition is precancerous ( )

# Salivary Glands



## Pleomorphic adenoma

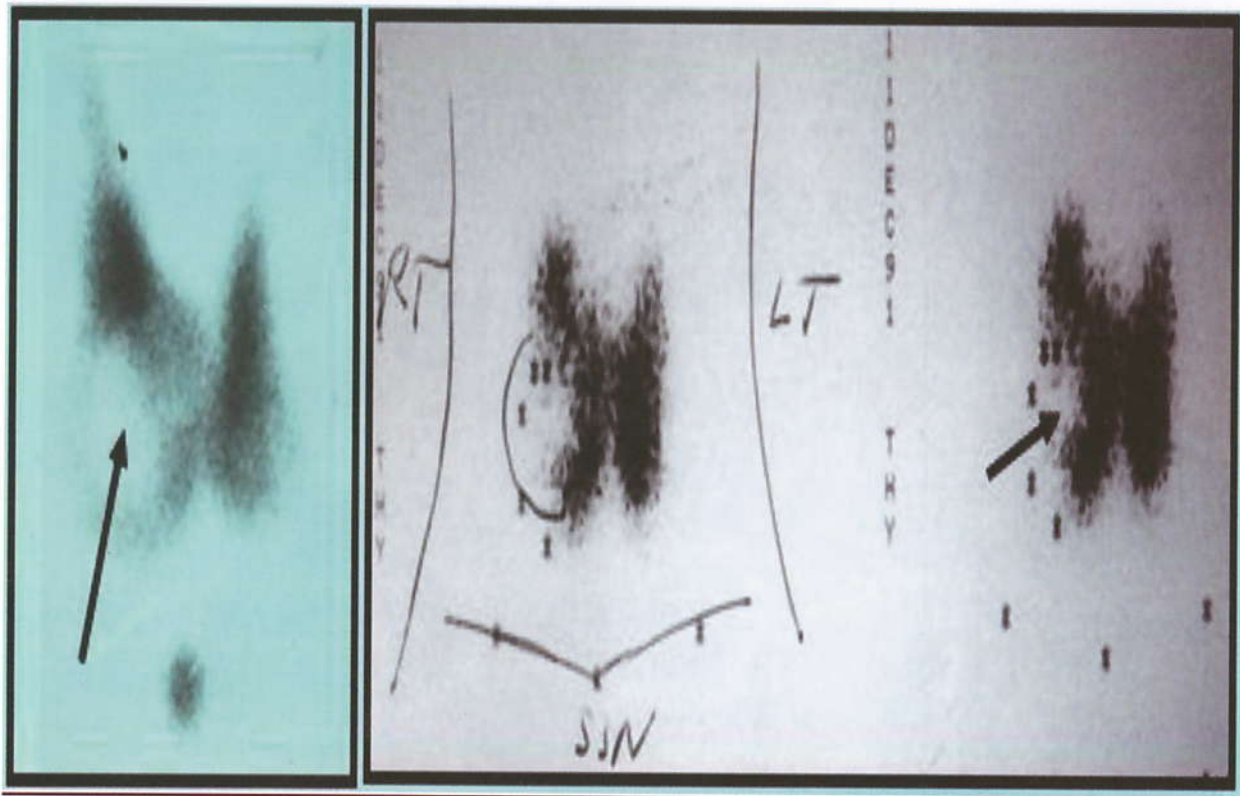
- CT scan seen as well-defined mass mostly in the parotid gland
- The commonest is pleomorphic adenoma

### Questions (True or false)

17. The mass seen is mostly malignant. ( )
18. Facial palsy is a common complication of this study ( )
19. Surgical enucleation is enough for removal of this condition. ( )
20. Superficial conservative parotidectomy is the treatment of choice for this condition. ( )



# Thyroid



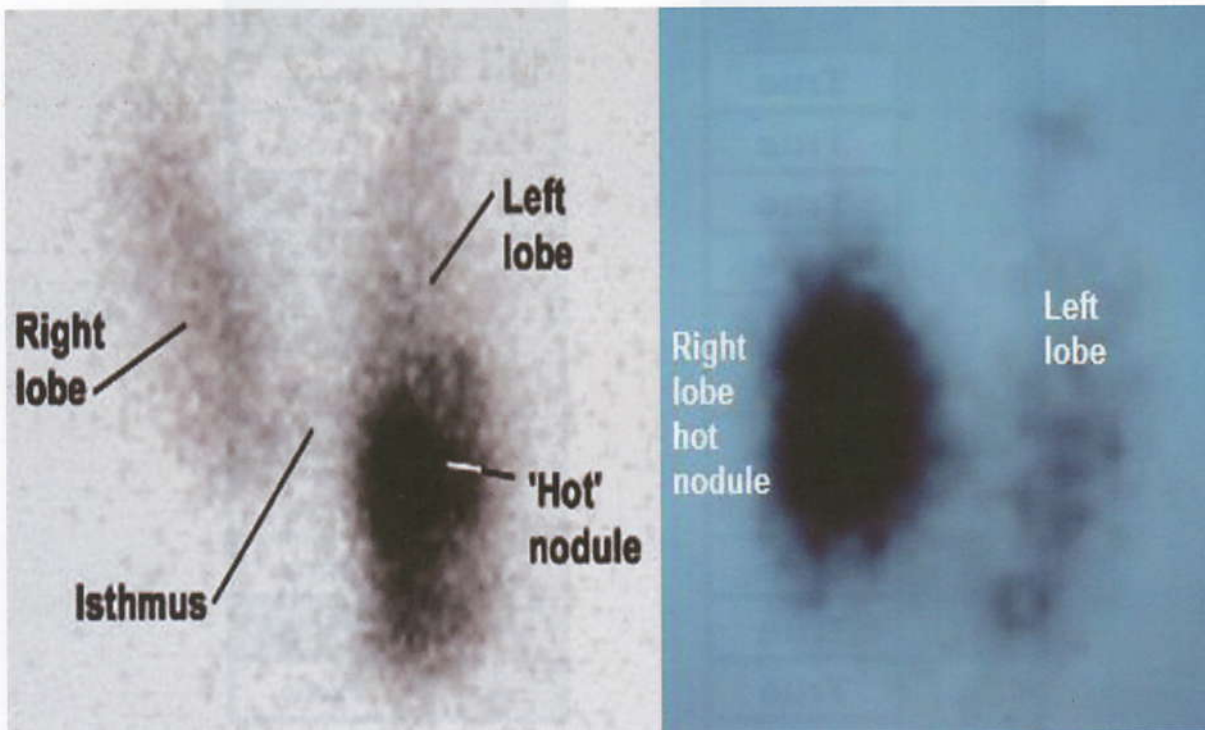
## Cold nodule

- Thyroid isotope scans that show a solitary cold nodule
- The differential diagnosis include
  - Malignant tumor
  - Benign tumor (adenoma)
  - Colloid nodule
  - Cyst

## Questions (True or false)

21. The main cause of this condition is simple nodular goiter. ( )
22. Fine needle aspiration cytology is indicated for this condition. ( )
23. Ultrasound can differentiate solid lesions from cystic lesions. ( )
24. Radioactive iodine is the main line of treatment. ( )
25. Surgery is the principle line of treatment for this condition. ( )
26. This patient has Thyrotoxicosis ( )
27. It may be a malignant lesion ( )
28. FNAC is contra indicated ( )
29. Biopsy is needed to confirm the diagnosis ( )
30. Propranolol can be useful treatment for this patient ( )
31. Tetany can be a post-operative complication ( )

# Thyroid



## Hot nodule

- Thyroid isotope scans that show a hot nodule.
- The rest of the gland shows reduced isotope uptake because of a low TSH.
- Autonomous toxic nodule

## Questions (True or false)

- |                                                                  |     |
|------------------------------------------------------------------|-----|
| 32. The Radio-isotope used is technetium 99                      | ( ) |
| 33. Bradycardia is a common sign                                 | ( ) |
| 34. Carpo-pedal spasm is a common clinical sign                  | ( ) |
| 35. It could turn malignant                                      | ( ) |
| 36. The patient has thyrotoxicosis                               | ( ) |
| 37. Neck u/s can help in diagnosis                               | ( ) |
| 38. Estimation of serum T3, T4 and TSH can confirm the diagnosis | ( ) |
| 39. Medical treatment is the treatment of choice                 | ( ) |
| 40. Thyrotoxic crisis is a possible complication                 | ( ) |
| 41. Radiotherapy is reserved for complicated cases only          | ( ) |



## Miscellaneous Key answer

|    |       |
|----|-------|
| 1  | FALSE |
| 2  | True  |
| 3  | True  |
| 4  | True  |
| 5  | True  |
| 6  | FALSE |
| 7  | True  |
| 8  | True  |
| 9  | True  |
| 10 | True  |
| 11 | True  |
| 12 | True  |
| 13 | True  |
| 14 | True  |
| 15 | True  |
| 16 | FALSE |
| 17 | True  |
| 18 | FALSE |
| 19 | FALSE |
| 20 | True  |
| 21 | True  |
| 22 | True  |
| 23 | True  |
| 24 | FALSE |
| 25 | True  |
| 26 | FALSE |
| 27 | True  |
| 28 | FALSE |
| 29 | True  |

|    |       |
|----|-------|
| 30 | FALSE |
| 31 | True  |
| 32 | True  |
| 33 | FALSE |
| 34 | FALSE |
| 35 | FALSE |
| 36 | True  |
| 37 | FALSE |
| 38 | True  |
| 39 | True  |
| 40 | FALSE |
| 41 | True  |

## Important points & tweets based on our questions

**Q2:**

- Fracture commonest at body of mandible usually close to mental foramen , where the bone is the weakest due to highest curvature , & deep canine sockets .

**Q3:**

- Pain on attempts to open the mouth , Blood stained saliva , Impaired speech & swallowing
- Anaesthesia of lower lip
- Coleman's sign , local tenderness , irregularity of line of teeth.

**Q4:**

- Plain X-ray is diagnostic , CT may be needed , panoramic view can show the whole mandible but its disadvantages ( cannot visualize condyles \* not for polytraumatized patients) .

**Q5:**

- 1<sup>st</sup> aid TTT , jaw supported with 4 tailed bandage 7 analgesics , antibiotics & mouth hygiene are important
- Then reduction & fixation for 3-6 weeks .

**N.B.:**

- Sialiectasis It's bronchiectasis of salivary gland
- There is degeneration of alveolar & duct system which become dilated
- DD → mumps (Bilateral)
- Sialography is investigation of choice
- Conservative ttt by finishing meal by a citrus drink to stimulate salivary secretion and massage of affecting gland to milk the accumulating epithelial debris
- TTT → antibiotics in acute attack of infection .

**Q 12:**

- Submandibular stones are opaque in 80% can be seen in plan occlusal view radiograph.

**Q15:**

- Stone that is palpable within the duct can be removed through mouth , but a stone in gland removed with the whole gland



## Important points &amp; tweets based on our questions

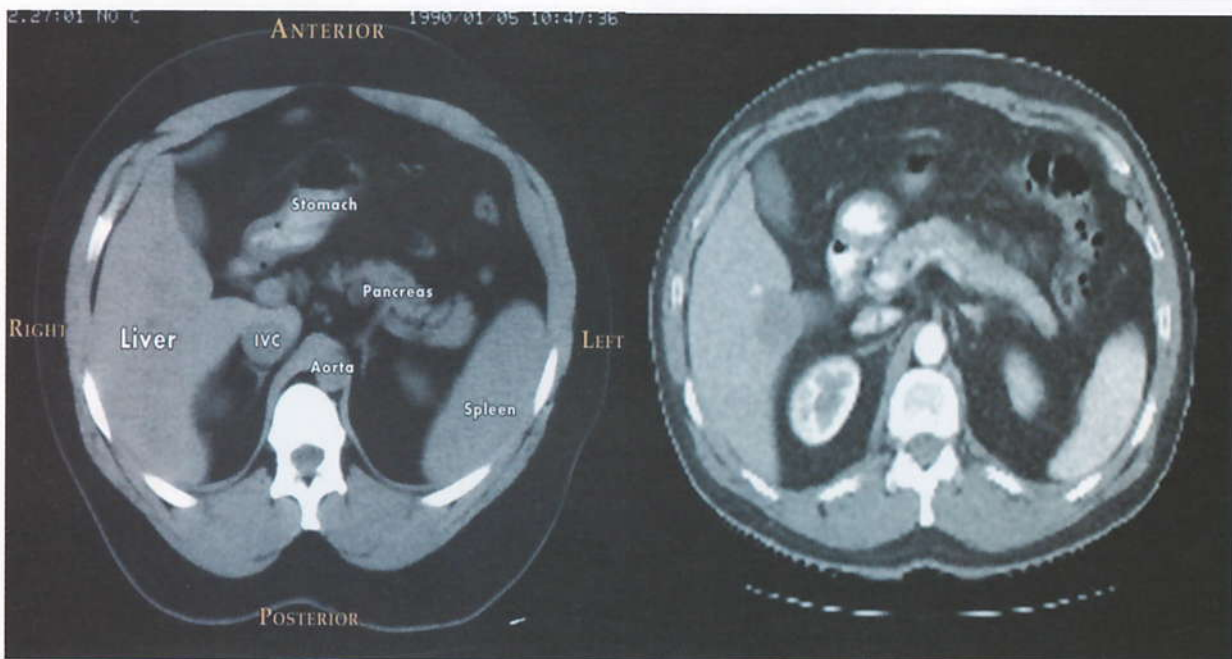
- Fracture commonest at body of mandible usually close to mental foramen, where the bone is the weakest due to highest curvature & deep canine sockets
- Pain on attempts to open the mouth, Blood stained saliva, Impaired speech & swallowing
- Anaesthesia of lower lip
- Coleman's sign, local tenderness, irregularity of line of teeth
- Plain X-ray is diagnostic, CT may be needed, panoramic view can show the whole mandible but its disadvantages (cannot visualize condyles \* not for posttraumatized patients)
- 1<sup>st</sup> aid TTT, jaw supported with 4 tailed bandage & analgesics, antibiotics & mouth hygiene are important
- Then reduction & fixation for 3-6 weeks
- Sialiectasis: It's bronchiectasis of salivary gland
- There is degeneration of alveolar & duct system which become dilated
- DD → mumps (Bilateral)
- Sialography is investigation of choice
- Conservative m by finishing meal by a citrus drink to stimulate salivary secretion and massage of affected gland to milk the accumulating epithelial debris
- TTT → antibiotics in acute attack of infection
- Submandibular stones are opaque in 80% can be seen in plain occlusal view radiograph
- Stone that is palpable within the duct can be removed through mouth, but a stone in gland removed with the whole gland

**-12-**

**CT  
SCAN**

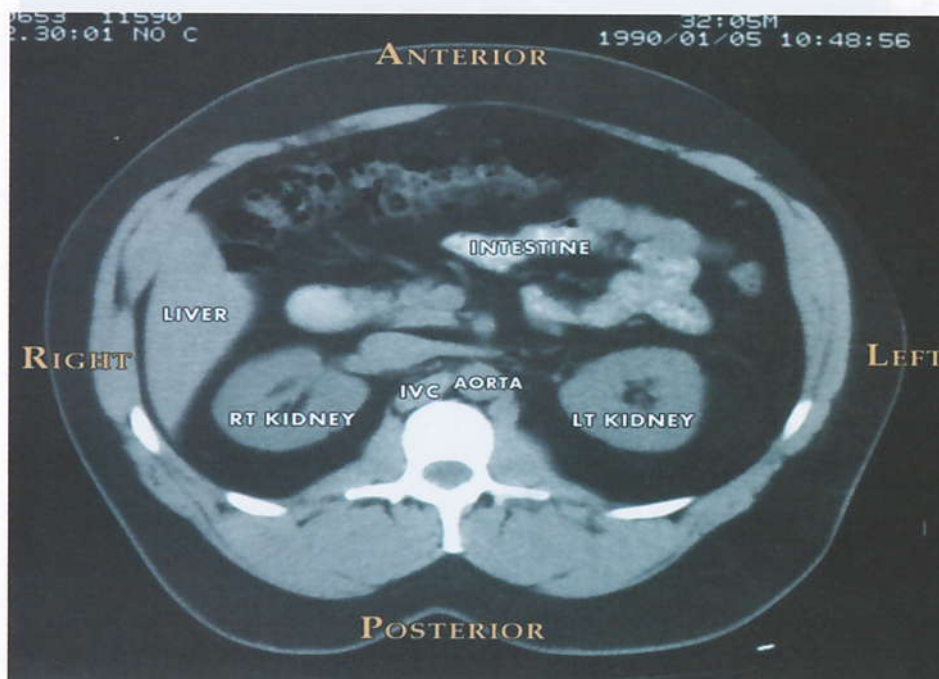


# Normal CT scan of the abdomen



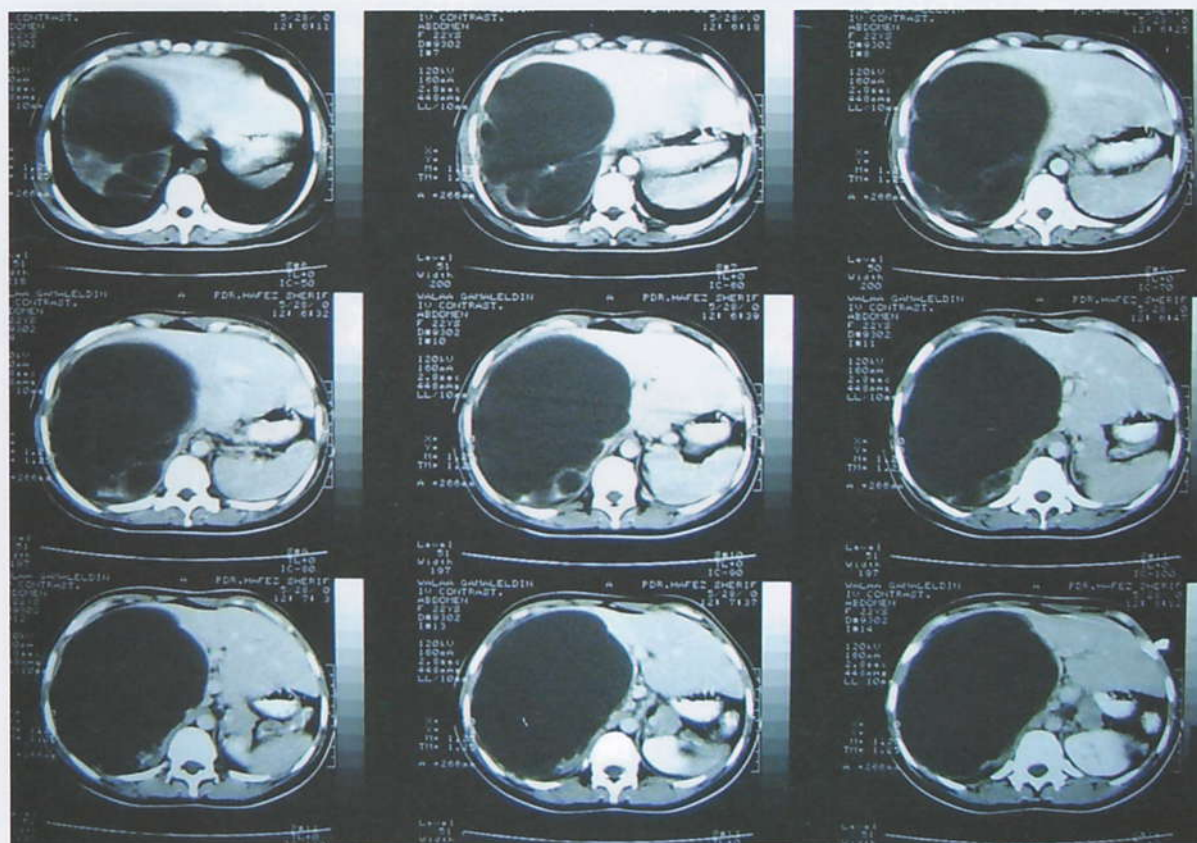
- Normal CT scan of the abdomen without IV contrast.
- Notice that the aorta and IVC look grey (compare with the white colour of vertebra).

- Normal CT scan of the abdomen with IV contrast.
- Notice that the aorta and IVC look white



- CT scan of abdomen showing normal kidneys

# Liver



- CT scan of abdomen
- Huge cyst in right lobe of liver.
- The commonest liver cyst is the Hydatid

## Hydatid cyst

## Questions (True or false)

1. The possible diagnosis is Hydatid cyst ( )
2. There is another cyst seen in the spleen ( )
3. Rupture of this cyst can lead to anaphylaxis ( )
4. Metronidazole is the first line of treatment ( )
5. Mebendazole can be a line of treatment ( )



# Liver

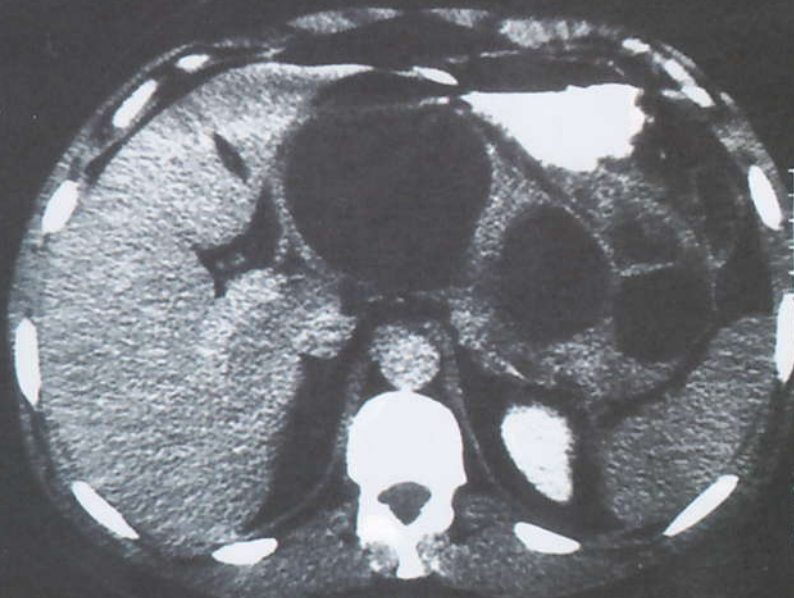
SOMATOM DRH  
 MOHAMED ABDEL AZIM M 36Y OUT PATIENT HC2  
 7-JUL-91 FRONT 1 22  
 16:52:37 H/SP  
 DU3:048  
 SCAN 13

L  
E  
F  
T

5 CM

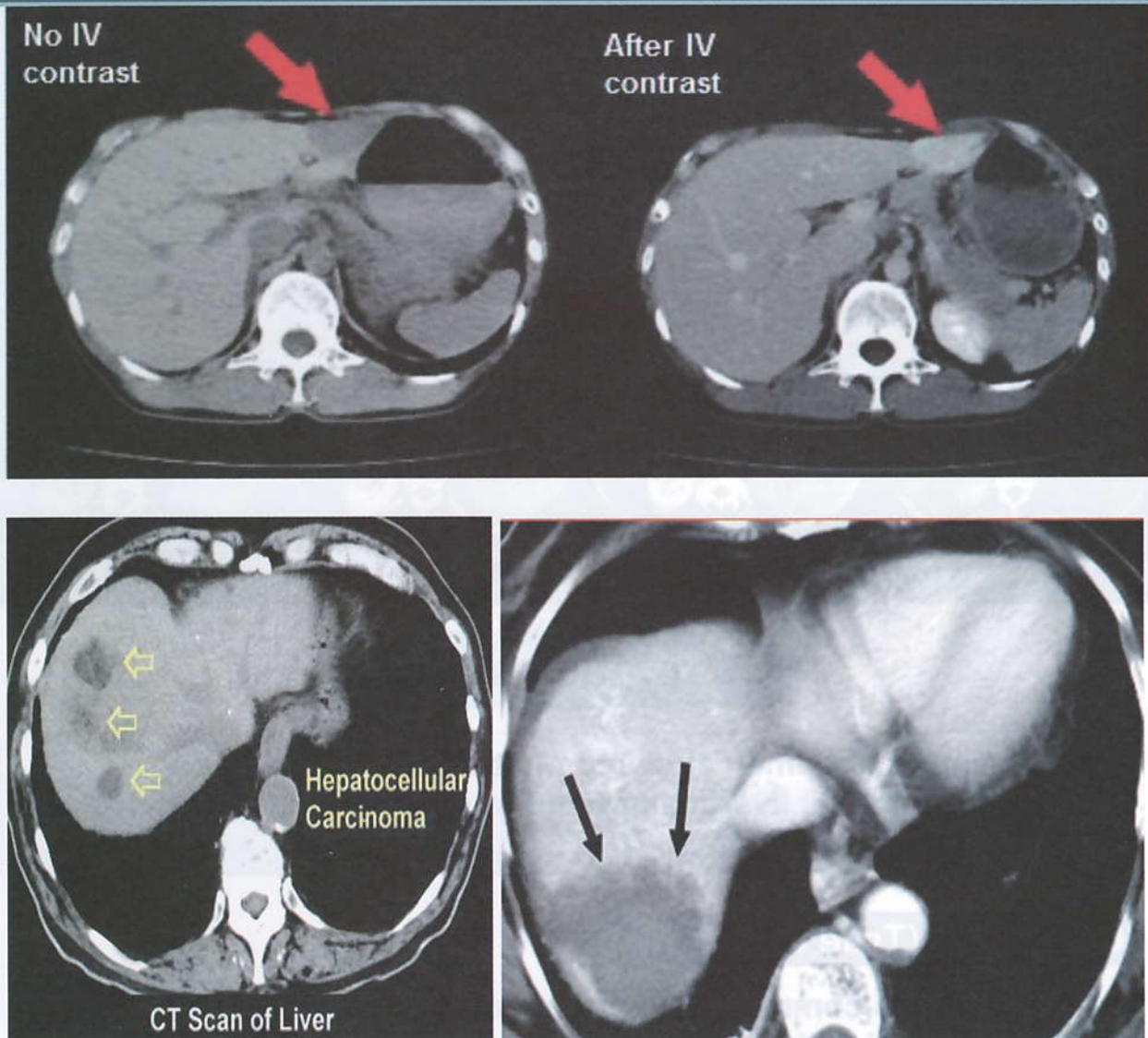
TI 4  
 KV 125  
 AS 31  
 SL 8  
 GT 0  
 TP 148

W 300  
 C 79  
 M



## Multiple cysts of liver

- CT scan of abdomen with IV contrast (aorta is white)
- Multiple cysts in left lobe of liver.



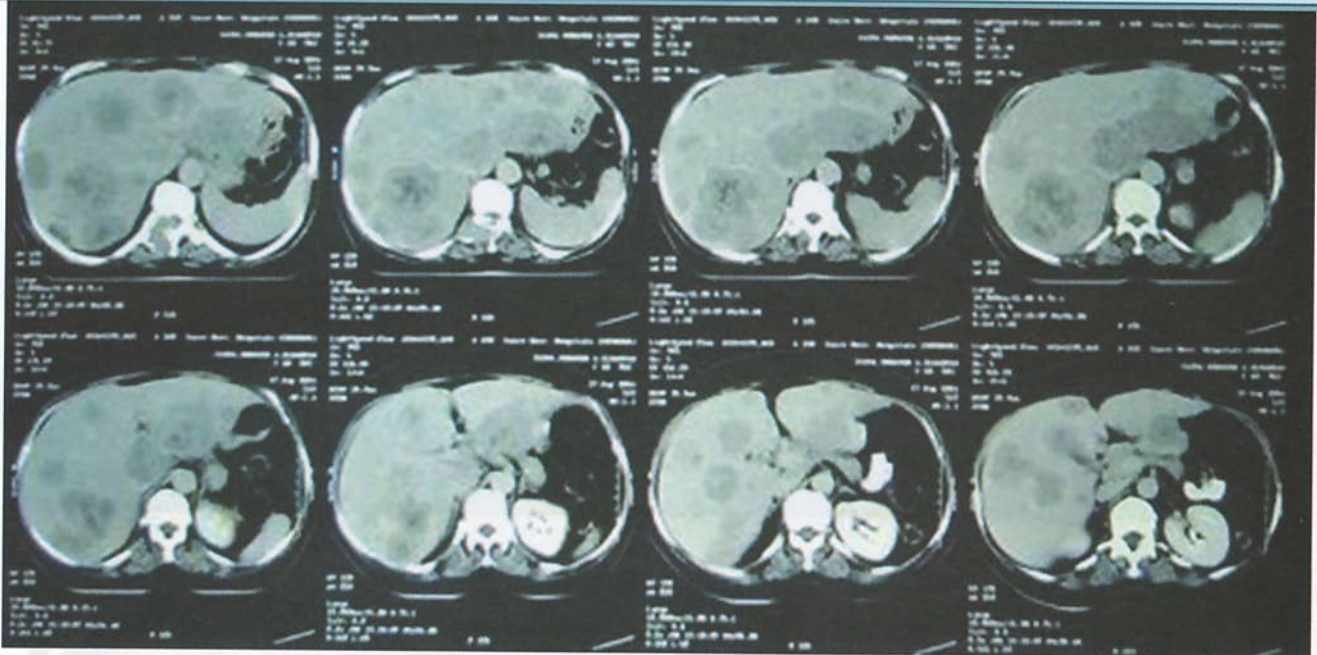
### Hepatocellular carcinoma (HCC)

- CT scan of abdomen showing a solitary lesion in left liver lobe.
- It shows enhancement after IV contrast injection, which is a character of hepatocellular carcinoma (HCC)

### Questions (True or false)

6. The lesion is occupying the right lobe of the liver ( )
7. A distended gall bladder is seen in this study ( )
8. Cirrhosis is the common etiological factor for this condition ( )
9. Serum alpha-fetoprotein can help in the diagnosis ( )
10. Chemo-embolisation is the best line of treatment for advanced cases ( )





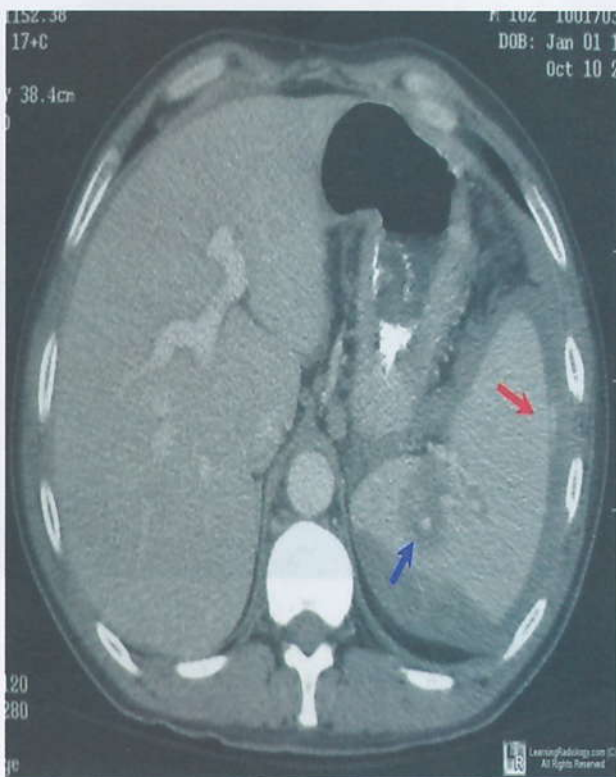
### Liver metastases

- CT scan of abdomen showing multiple liver metastases
- The commonest liver malignancy is secondary deposits from GI and pancreatic cancer

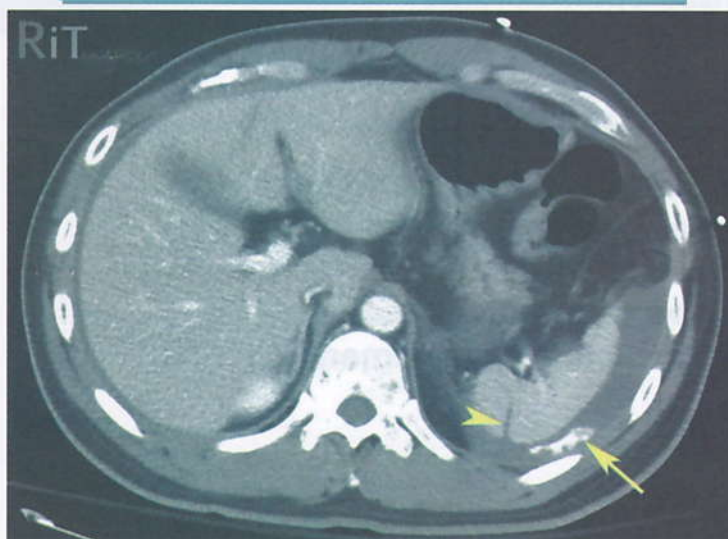
### Questions (True or false)

- |                                                |     |
|------------------------------------------------|-----|
| 11. This lesion is common than 1ry tumor       | ( ) |
| 12. The pathological type is adenocarcinoma    | ( ) |
| 13. Patient represents by underlying cause     | ( ) |
| 14. This patient present with chest pain       | ( ) |
| 15. Chemotherapy is the main line of treatment | ( ) |

# Spleen



## Splenic tear



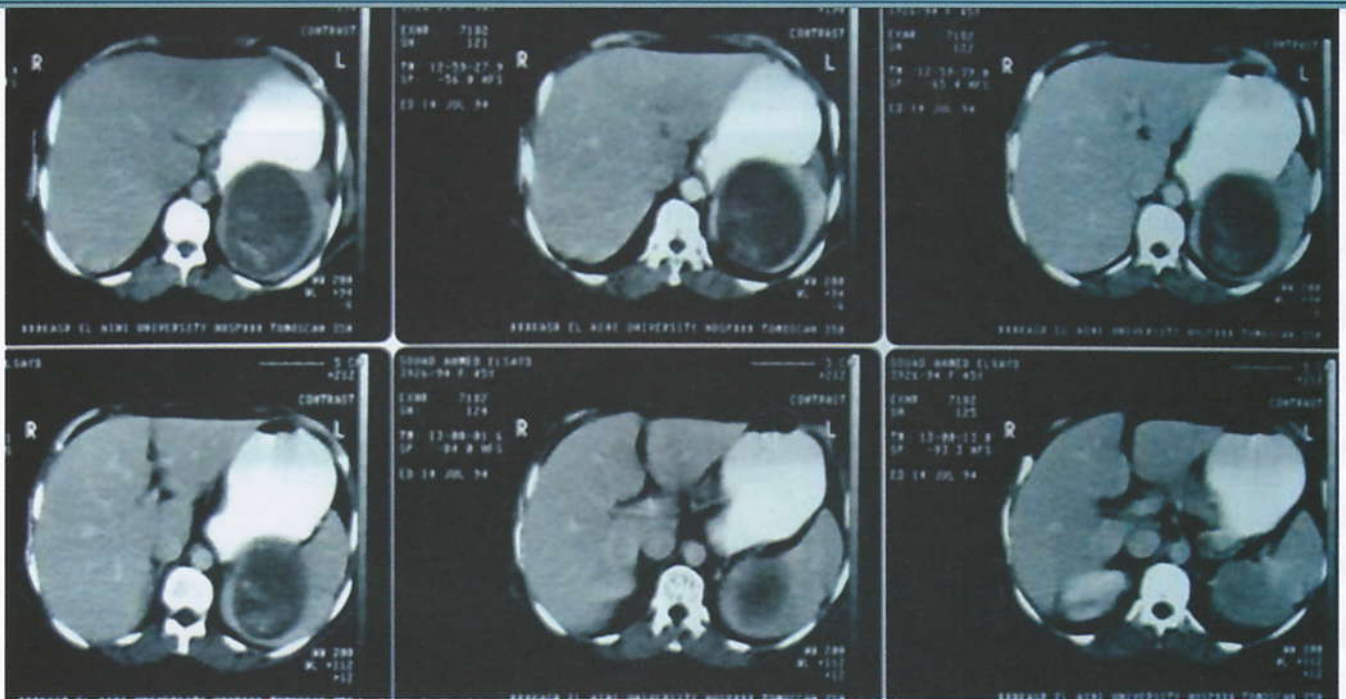
- CT scan of abdomen with IV contrast showing a deep tear of spleen and surrounding haematoma

## Questions (True or false)

16. Trauma is the exciting cause
17. Liver shows similar lesion
18. Cullen's sign may be present
19. Splenectomy is always the line of treatment
20. Pneumovax is always indicated post-operative

( )  
( )  
( )  
( )  
( )





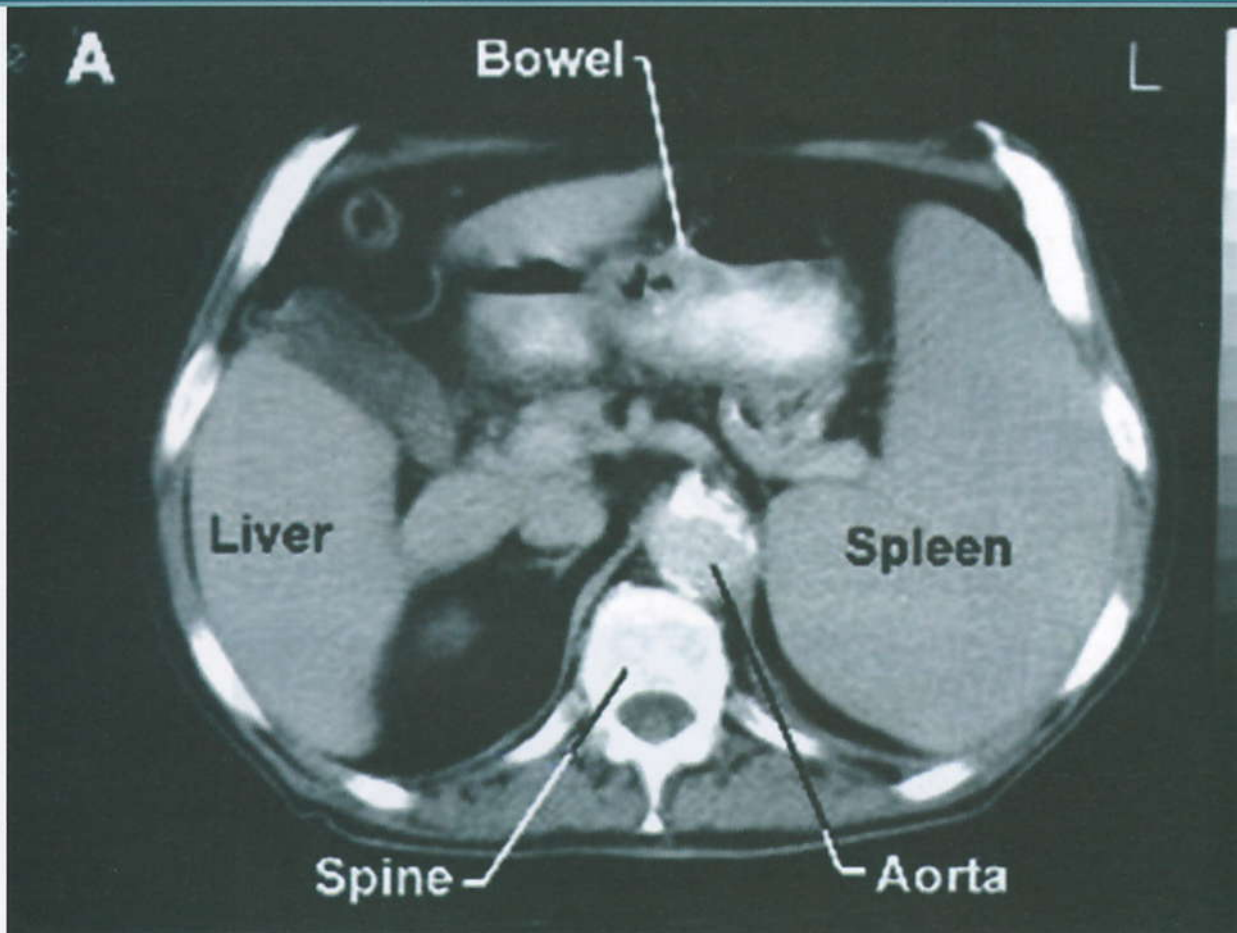
### Splenic cyst

- CT scan of abdomen that shows a cyst of the spleen.
- The most common causes are blood cysts (post-traumatic) and hydatid cysts.
- Treatment is splenectomy

### Questions (True or false)

21. The possible diagnosis is Hydatid cyst
22. There is another cyst seen in the liver
23. Rupture of this cyst can lead to anaphylaxis
24. This cyst may be traumatic
25. Splenectomy is the line of treatment

( )  
( )  
( )  
( )  
( )  
( )



### Splenomegaly

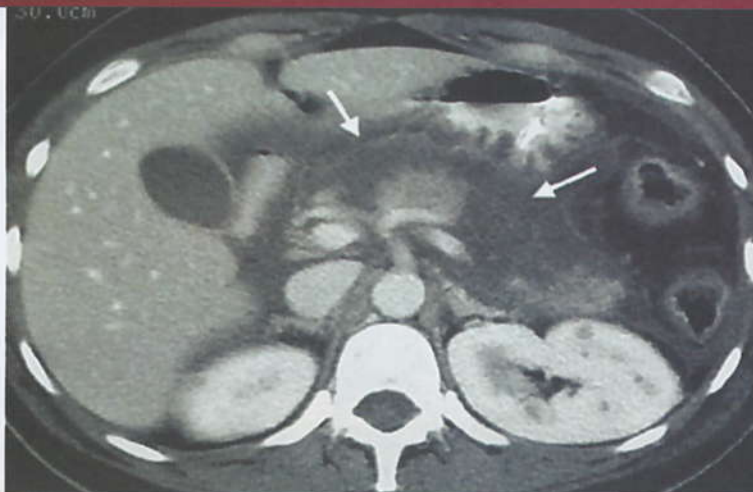
- CT scans of abdomen with IV contrast.
- They show splenomegaly

### Questions (True or false)

26. Patient presents by mass in Rt. Hypochondrium ( )
27. Patient presents by mass in Lt. hypochondrium ( )
28. Trauma is the underlying cause ( )
29. This spleen is always usually tender ( )
30. This spleen is always usually huge ( )



# Pancreas

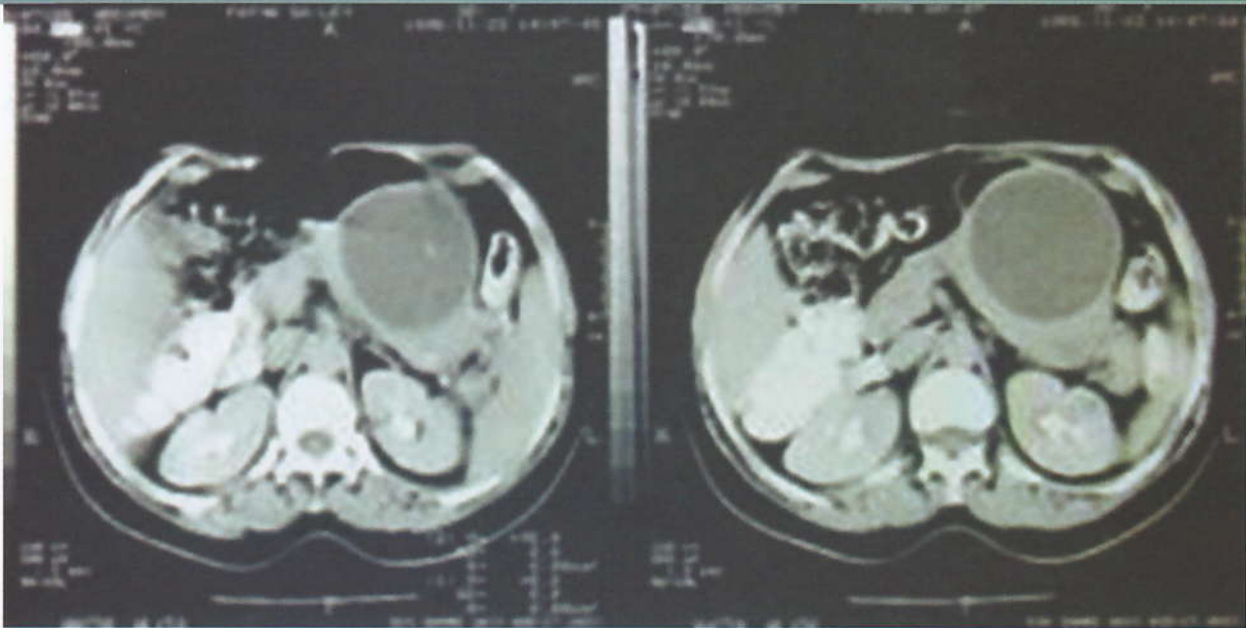


## Acute pancreatitis

- CT scan of abdomen with IV contrast
- The pancreas is markedly thickened and is edematous.
- This is acute pancreatitis

### Questions (True or false)

31. There is a swollen edematous pancreas seen in this study ( )
32. Biliary obstruction by stones could be the underlying cause ( )
33. Cyst formation in the lesser sac could be a possible  
Complication ( )
34. Serum amylase can help in the diagnosis ( )
35. Surgery is the first line of treatment ( )



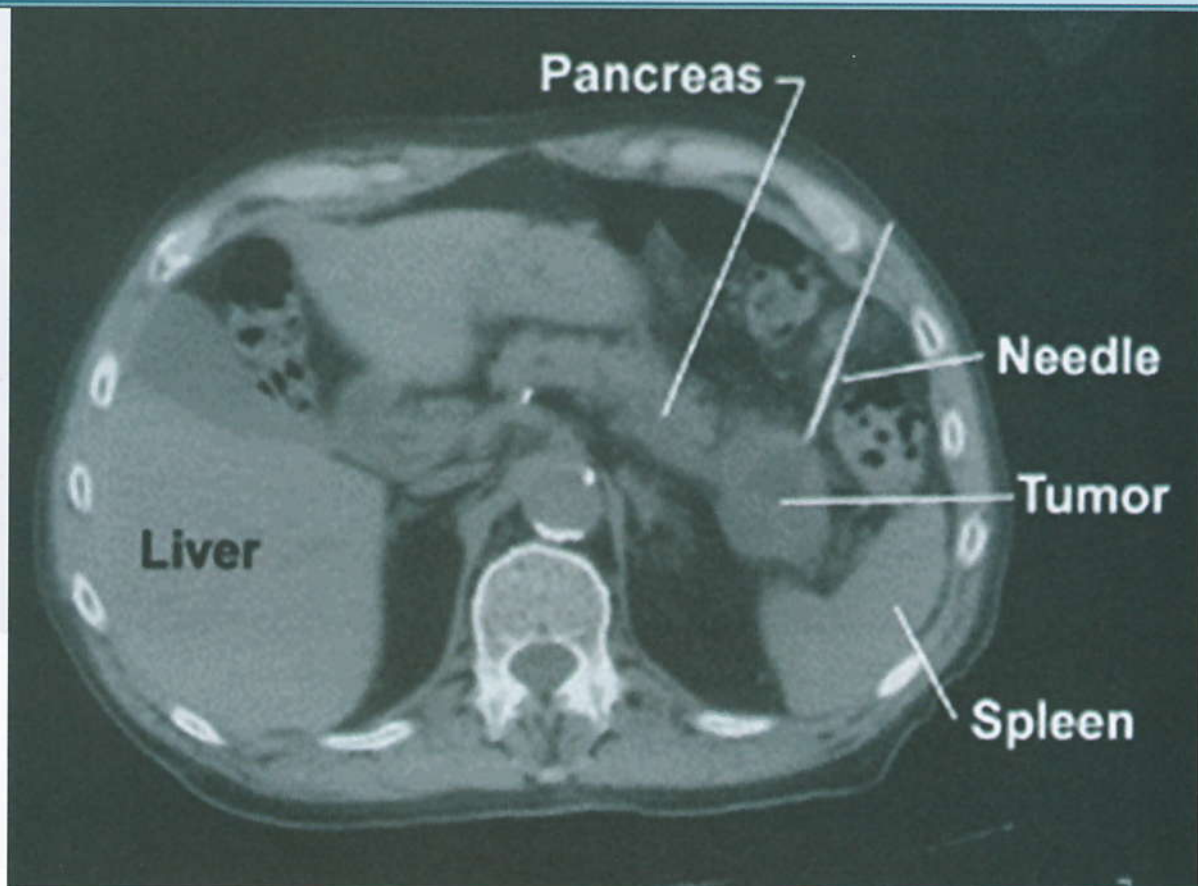
### Pancreatic pseudocyst

- CT scan of abdomen
- The tail of the pancreas contains a cyst.
- The commonest type is the pancreatic pseudocyst

### Questions (True or false)

36. This cystic swelling is related to the pancreas ( )
37. Infection and abscess formation is a possible complication ( )
38. Barium meal can be a useful method of investigation ( )
39. ERCP can be a method of treatment of this condition ( )
40. Cysto-gastrotomy is the treatment of choice ( )





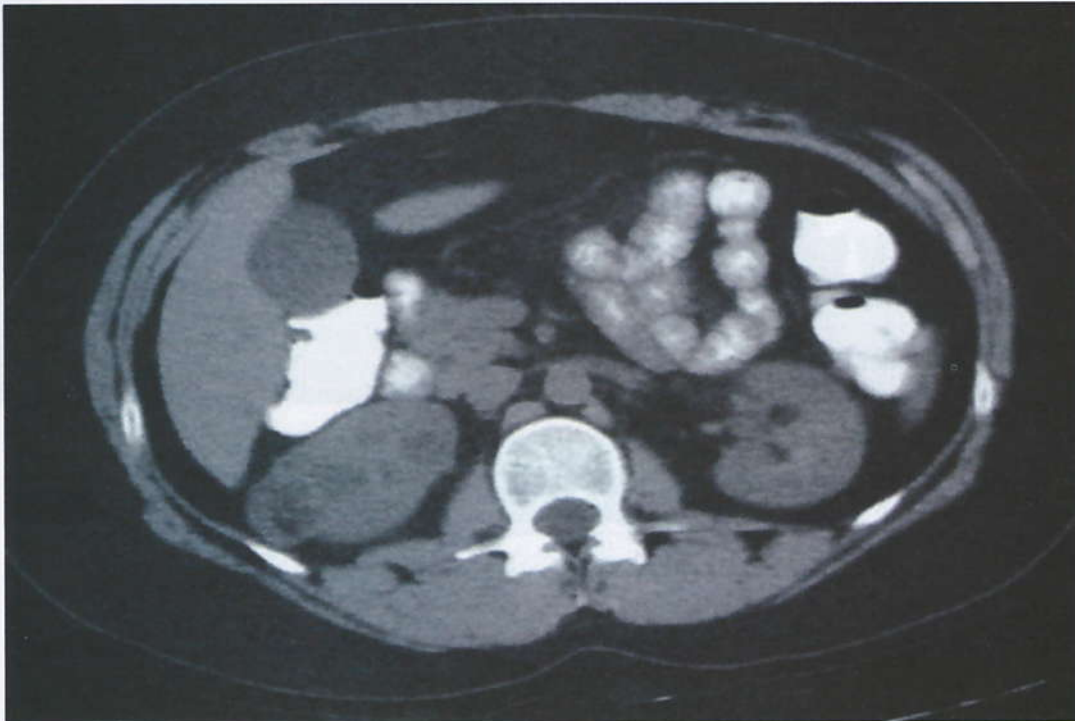
- CT scan of abdomen without IV contrast
- Solid mass at tail of pancreas
- In this case CT-guided fine needle aspiration (FNA) is being done to diagnose the nature of this lesion
- Notice calcification of atherosclerotic patches in abdominal aorta

### Questions (True or false)

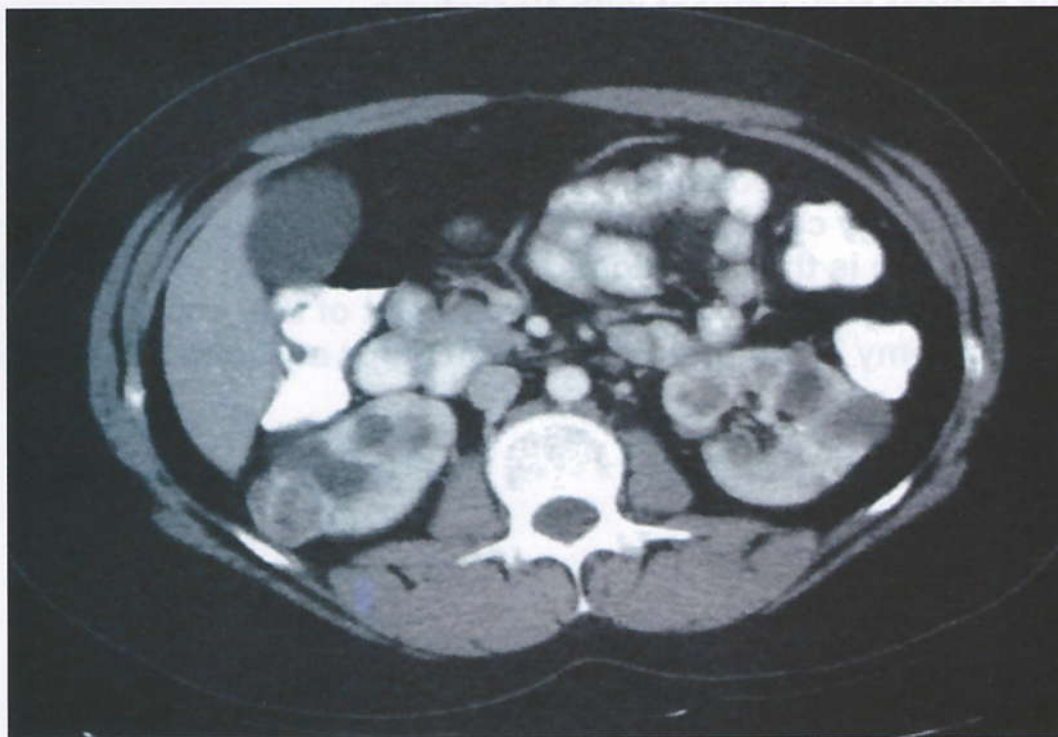
- |                                                    |     |
|----------------------------------------------------|-----|
| 41. The possible diagnosis is cancer tail pancreas | ( ) |
| 42. Theis old atherosclerotic                      | ( ) |
| 43. It considers the commonest site                | ( ) |
| 44. The presentation is obstructive jaundice       | ( ) |
| 45. Surgery is the main line of treatment          | ( ) |

# Kidney

## Polycystic kidney

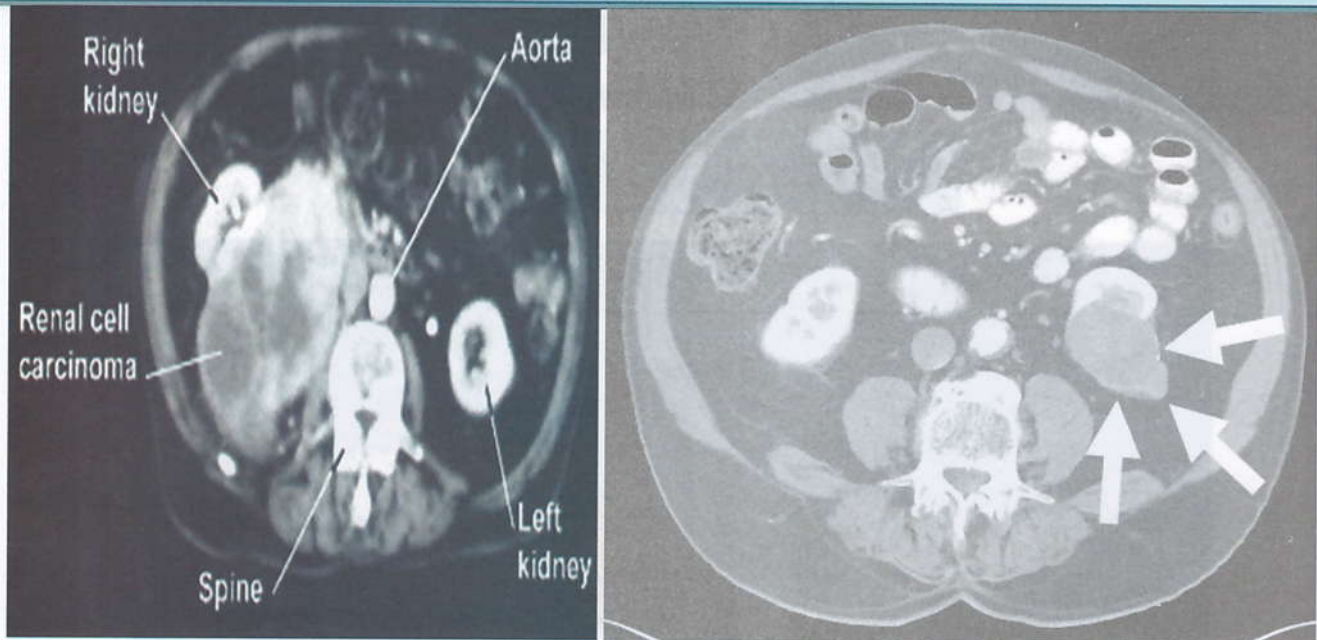


▪ Plain CT scan of abdomen



▪ CT scan of abdomen with IV contrast



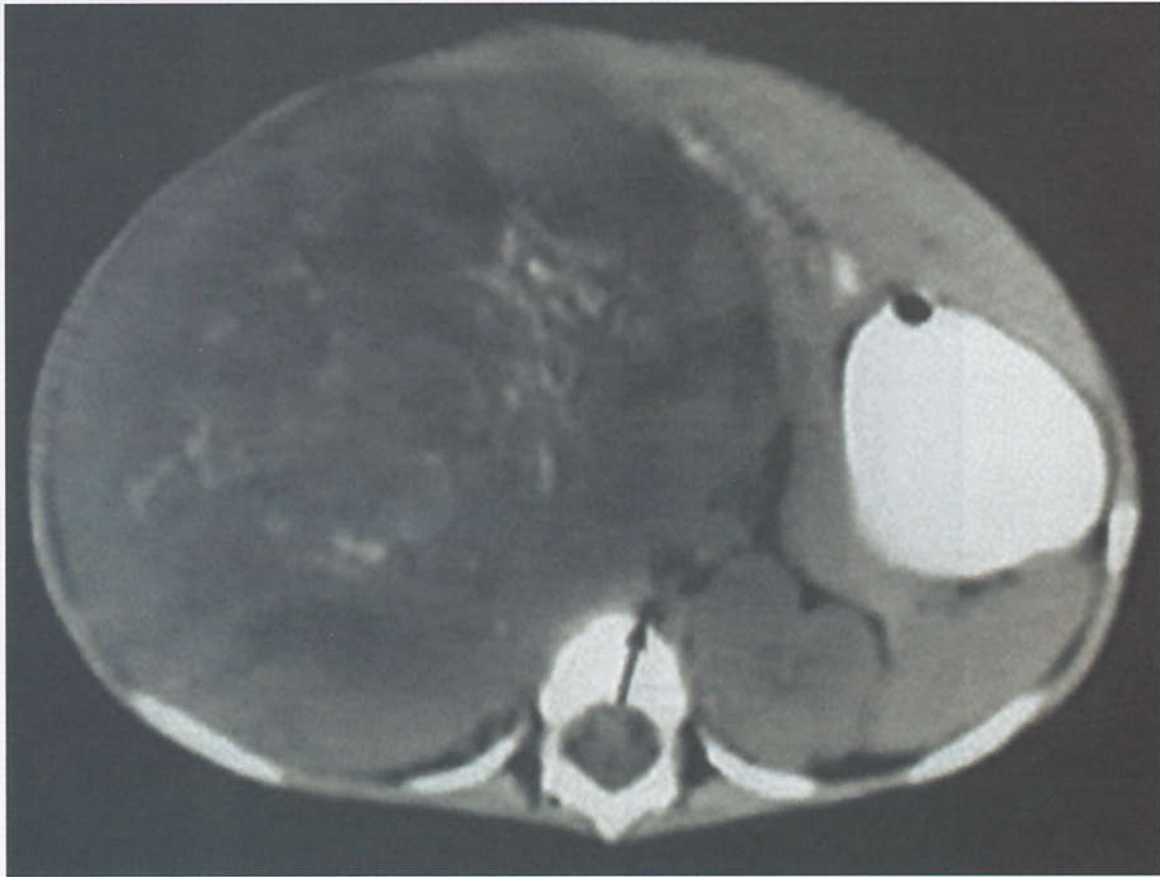


## Hypernephroma

- CT scan of abdomen
- Right renal cell carcinoma (hypernephroma)

### Questions (True or false)

- |                                                                    |     |
|--------------------------------------------------------------------|-----|
| 46. This is a left sided peri-nephric abscess                      | ( ) |
| 47. This patient may present with Necroturia                       | ( ) |
| 48. Painless Haematuria is the commonest presentation              | ( ) |
| 49. The common site of this lesion is the lower pole of the kidney | ( ) |
| 50. Varicocele is a common complication                            | ( ) |
| 51. Hypertension is a possible complication                        | ( ) |
| 52. Urine cytology can confirm the diagnosis                       | ( ) |
| 53. CT abdomen is the investigation of choice                      | ( ) |
| 54. Nephrectomy is the best line of treatment of this condition    | ( ) |
| 55. Nephrostomy is the principle treatment for advanced cases      | ( ) |



### Nephroblastoma

- CT scan of abdomen of a child
- The right kidney is replaced by a huge solid mass that occupies a large part of abdomen
- Nephroblastoma (Wilm's tumor)

### Questions (True or false)

- |                                                       |     |
|-------------------------------------------------------|-----|
| 56. The possible diagnosis is cancer liver            | ( ) |
| 57. There is another cyst related to pancreas         | ( ) |
| 58. It considers the commonest lesion in adult        | ( ) |
| 59. The main presentation is abdominal mass           | ( ) |
| 60. Surgery is the main line of treatment if operable | ( ) |



## CT Key answer

|    |       |
|----|-------|
| 1  | True  |
| 2  | FALSE |
| 3  | True  |
| 4  | FALSE |
| 5  | True  |
| 6  | FALSE |
| 7  | FALSE |
| 8  | True  |
| 9  | True  |
| 10 | True  |
| 11 | True  |
| 12 | True  |
| 13 | True  |
| 14 | FALSE |
| 15 | True  |
| 16 | True  |
| 17 | FALSE |
| 18 | True  |
| 19 | FALSE |
| 20 | FALSE |
| 21 | True  |
| 22 | FALSE |
| 23 | True  |
| 24 | True  |
| 25 | True  |
| 26 | FALSE |
| 27 | True  |
| 28 | FALSE |
| 29 | FALSE |
| 30 | FALSE |

|    |       |
|----|-------|
| 31 | True  |
| 32 | True  |
| 33 | True  |
| 34 | True  |
| 35 | FALSE |
| 36 | True  |
| 37 | True  |
| 38 | True  |
| 39 | FALSE |
| 40 | True  |
| 41 | True  |
| 42 | True  |
| 43 | FALSE |
| 44 | FALSE |
| 45 | True  |
| 46 | FALSE |
| 47 | FALSE |
| 48 | True  |
| 49 | FALSE |
| 50 | True  |
| 51 | FALSE |
| 52 | FALSE |
| 53 | True  |
| 54 | True  |
| 55 | FALSE |
| 56 | FALSE |
| 57 | FALSE |
| 58 | FALSE |
| 59 | True  |
| 60 | True  |

## Important points & tweets based on our questions

**Q3:**

- Majority of cysts continue to enlarge gradually, in others parasites dies & cyst calcified
- Other cases may complicate by infections / rupture into biliary passages cause jaundice / rupture into peritoneal cavity cause dissemination and anaphylaxis.

**Q5:**

- Medical TTT by Mebendazole or Albendazole
- Is not substitute for surgery used only if (elderly frail patient/ recurrent cases / routine postoperative).
- Usual dose is 400-600 mg 3 times daily for 1 month.

**Q8:**

- Aetiology of HCC \* infection by HCV OR HBV \* CIRRHOSIS especially posy alcoholic or post hepatic cirrhosis

**Q9:**

- Serum alkaline phosphatase often elevated, serum AFP is a tumor marker, normal adult level (0-10 ng/ml) if > 200 ng/ml → suggestive, if > 2000 ng/ml → diagnostic for HCC.

**Q11:**

- Liver metastasis are 20 times more common than 1st liver tumors

**Q12:**

- It is adenocarcinoma, may be synchronous or metachronous, metastatic nodules are white multiple umbilicated bec. Of central necrosis.

**Q15:**

- TTT usually palliative by chemotherapy.

**Q16:**

- Splenic rupture predisposed by diseases which make it soft or more friable, or enlargement makes it more liable for trauma either blunt trauma or penetrating.

**Q18:**

- BALANCE'S sign: shifting dullness on rt side & fixed dullness on LT side.
- Kehr's sign: pain in left shoulder due to referred pain from diaphragmatic irritation.
- Cullen's sign: bluish discoloration around umbilicus in 20% of cases.

**Q46:**

- RCC is adenocarcinoma, arises from cells of PCT, lesion shows clear cell pattern & cholesterol crystals. RCC is the commonest renal neoplasm (75% of all renal tumors) more in males, more to be unilateral, usually above 50-70 years.
- Haematuria present in 50% of cases. (painless, recurrent, profuse, total) pain in 40% (due to stretch of renal capsule by neoplasm or passage of blood clot cause ureteric calculi), mass in 30% .... The classical triad in 10% of cases
- The triad usually indicates advanced cases.



- Rapidly 2ry enlarging varicocele that does not empty by scrotal elevation suggest RCC.
- systemic syndromes as Amyloidosis , polycythemia& hypercalcemia in 5% of cases.
- CT abdomen is mandatory, very accurate in detecting exact size , site consistency of lesion , detect invasion of renal capsule , LNS enlarged or invasion of IVC.
- for early operable cases( stage 1& 2) radical nephrectomy is the only hope for cure.

# Imaging in Surgery

## Ultrasound (SONAR)

= Sound on navigation and Ranging

### Definition

- Sound waves at frequency between 2.5 - 7.5 MHz, which is more than what the human ear can hear.

### Uses

- **Diagnostic:**
  - Easy, non-invasive and can be used Intra-operative (e.g. laparoscopic U/S).
  - Guided biopsy.
- **Therapeutic:**
  - Guided drainage.
  - Renal stones.

### Disadvantages

- **Poor in:**
  - (Gas) e.g. colon → solved by laparoscopic US and endoscopic US
  - Fat people

### Application

- 1- **Gall bladder:** calculi, shape, size, acute and chronic cholecystitis.
- 2- **Liver and spleen:** rupture, shape, size, acute and chronic hepatitis, abscess.
- 3- **Shunt surgery:** preoperative → localization of renal vein and pattern of splenic vein.
- 4- **Jaundice:** 1<sup>st</sup> radiological investigation → intra and extra hepatic biliary system.
- 5- **Ascites:** free fluid in hepato-renal pouch or in flanks.
- 6- **Acute abdomen:** help in detection of causes e.g. ruptured cyst.
- 7- **Colon:** bad in diagnosis but may detect a mass.
- 8- **Stomach:** bad in diagnosis but may detect mass if > 3 cm.
- 9- **Anterior abdominal wall** → desmoid tumor.
- 10- **Retro-peritoneal tumors.**
- 11- **Kidney:**
  - Calculi, site, size, dilatation (calyces, pelvis and hydro and pyonephrosis).
  - Cyst (solitary, polycystic kidneys).
  - Ectopic kidney.
  - Peri-nephric abscess.
  - Chronic glomerulonephritis.
- 12- **Ureters:** dilatation or stones.
- 13- **Urinary bladder:** Stone, mass, diverticulae or cystitis.
- 14- **Prostate:** size, pattern, BPH, cancer (better by trans-rectal US).
- 15- **Testis:** tumors, undescended testis, spermatocele, hydro, pyo or hematocele.
- 16- **Vascular:**
  - Aorta: AAA if > 3 cm.
  - Hepatic vein, portal vein and splenic vein.
  - Renal blood vessels.
- 17- **Breast:**
  - Mass (if solid and > 2 cm → echogenic).
  - Cysts (e.g. abscess → sonolucent).
- 18- **Thyroid:** solid mass, cyst.
- 19- **Salivary glands:** stone, mass.
- 20- **Chest:** diaphragmatic movement, subphrenic collection, pleural effusion and mass.



# Laparoscopy in Surgery

## Advantages

- Less pain.
- Less hospital stay.
- Early ambulence.
- Better cosmetically.

## Indications

### 1- Diagnostic:

#### A- Elective:

- Liver, GB diseases (trans-hepatic, trans-cystic).
- Spleen: hepato-splenomegaly.
- Oncology: staging and biopsy.

#### B- Emergency:

- Abdominal trauma, acute abdomen, adhesions.

### 2- Therapeutic:

- Laparoscopic cholecystectomy, appendectomy, varicocelelectomy, vagotomy, nephrectomy and cystectomy (UB).
- Adhesiolysis.
- Herniorrhaphy or hernioplasty.

## Contraindications

#### A- major:

- Pregnancy, paralytic ileus and generalized peritonitis.
- Coagulation disorders, cardiac and respiratory disease.

#### B- Minor:

- Obesity.
- Hiatus hernia.
- Irreducible external hernia.

#### C- Specific:

- Appendectomy → phlegmon of caecal wall perforation near the base.
- Carcinoid syndrome.

## Preoperative preparation

- Inform patient (consent).
- Anesthesia.
- NGT.
- Clean the umbilicus.

## Preoperative medication

- Atropine → ↓ vagal tone.
- Diazepam → ↓ anxiety.

## Anesthesia

- GA, regional Anesthesia (according to type of operation).

## Principle

- Pneumo-peritoneum by NO<sub>2</sub> or CO<sub>2</sub> (better) → improves vision & decrease tissue trauma.
- 4 skin stabs (½ - 1 cm) → 1 for camera and 3 for instruments.
- Inspect the abdomen → then complete the operation.
- Remove instruments → deflation → clean wound (iodine or alcohol).
- Close by 3/0 or 4/0 silk suture.

## Complications

### Intra-operative

- Emphysema of skin, omentum, mediastinum and gas embolism.
- Blood vessel injury: epigastric BVs, IVC.
- Hollow viscus lesion: GB, intestine → escape of contents → peritonitis.
- Loss of foreign body e.g. clips.

### Postoperative

- Delayed hemorrhage and late discovery of hollow organ injury (UB, colon).
- DVT (↑ risk of DVT in laparoscopic surgery in urology > general).
- Postoperative shoulder pain.

## Radio-isotope Scans (Nuclear Medicine)

### Diagnosis

- Most commonly used is  $Tc^{99}$
- **Others:**
  - Heart →  $Thalium^{201}$  → myocardial infarction.
  - Gallium-citrate ( $Ga^{67}$ ) → tumor, infection, inflammation.
  - Thyroid → iodine ( $I^{121}$ ).
  - Blood cells (chromium  $Cr^{51}$ ) → RBCs sequestration in spleen.

## Computed Tomography

### Technique

- X-ray tube around the patient emitting radiation beams with serial X-rays → computer will display it as regularly-spaced cross sections.
- Air will appear dark, and bone will appear white.

### Advantages

- More accurate, clear and some lesions are better diagnosed by it

### Disadvantages

- Expensive and hazardous

## Magnetic Resonance Imaging (MRI)

- Nuclear magnetization (by nuclei with odd number of protons e.g. hydrogen, carbon or phosphorus, placed in a magnetic field).

### Technique

- Radiofrequency pulses emitting signals to the computer → change it into image.

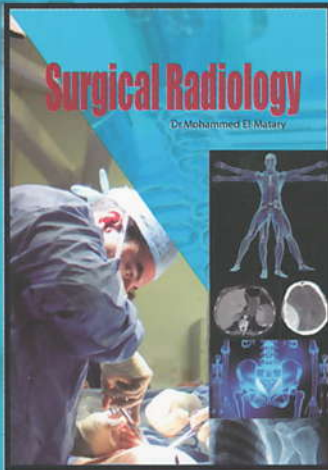
### Advantages

- Gives better resolution for soft tissue than CT, so it is the first investigation for brain tumors, cerebral hemorrhage and infection.
- Also in: neck, mediastinum, abdomen, pelvis and orthopedics.

### Disadvantages

- In spite of being not biologically hazardous, it is contraindicated in cardiac pace makers, metal prosthetics.





# Surgical Radiology

Dr. Mohammed El-Matary

Books by the author:

General Surgery

Special Surgery

Gastrointestinal Surgery

Clinical Surgery

MCQ part1

MCQ part2

MCQ part3

Surgitunes

Tweets

Mind Maps

Cases

Operative

Radiology

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